

MINING WORLD

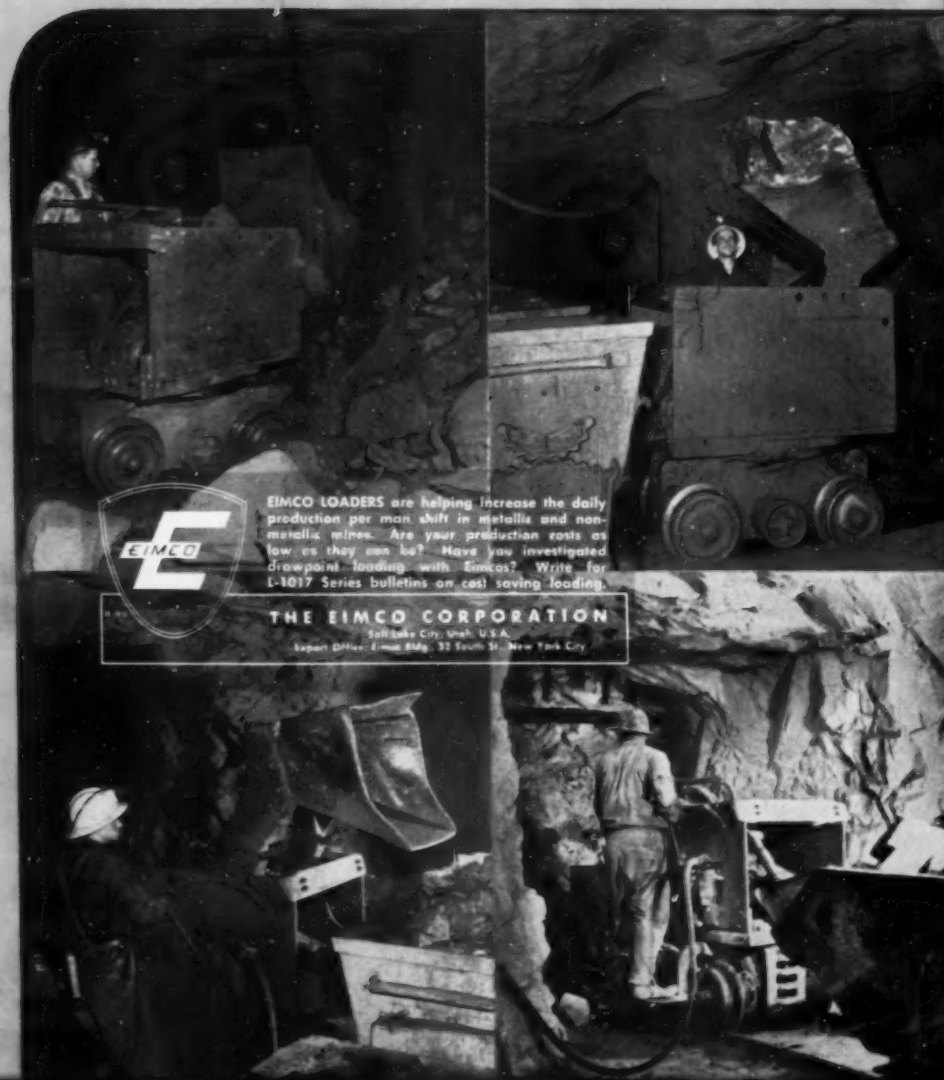
How
Bunker Hill
Prepares Uniform
Lead Furnace
Charge

Page 44

FEBRUARY 1955

VOL. 17 No. 2

35 cents a copy
in sterling 3s



EIMCO LOADERS are helping increase the daily production per man shift in metallic and non-metallic mines. Are your production costs as low as they can be? Have you investigated drawpoint loading with Eimcos? Write for L-1017 Series bulletins on cost saving loading.

THE EIMCO CORPORATION

Salt Lake City, Utah, U.S.A.
Export Office: Eimco Bldg., 32 South St., New York City

How an Arizona clay pit handles a lot of "dead" material **fast**



Two CAT® DW20s with No. 20 Scrapers are key machines on this job, which involves stripping 160,000 cu. yds. of blow sand a month from a deposit of Bentonite clay located six miles east of Sanders, Arizona. These rigs, which are among seven Caterpillar tractor-scraper units owned by McCarrell and Grimes, load 19 yards in 40 seconds and spread in 12 seconds. That's fast production in "dead" material—a real test of tractor and scraper performance—and it enables the firm to mine and ship 50 carloads of Bentonite per week.

G. K. Grimes, co-owner of the firm, says, "Our DW20s have plenty of power, are easy to handle, and move a lot of this blow sand fast." The husky Cat Diesel in the DW20 is carefully matched to the tractor and to scraper capacity for easy handling and long life. Oversize tires give excellent flotation and traction on wet surfaces and uneven terrain.

The DW20's teammate, the No. 20 Scraper, has a heaped capacity of 20 yards, with sideboards, 23 yards. This big load is cradled low for stability. Clean, top-of-bowl design gives good operator visibility and makes the scraper an easy target for shovel loading. The No. 20 loads fast, with

a live, boiling action. Ejection is positive and even, thanks to the "dozer-type ejector. Controls are simple yet precise, with no complicated mechanism to get out of order.

Here's what it means to you: fast cycle times, long work life, no need to pamper your equipment. Your Caterpillar Dealer—who provides fast service and genuine factory parts—will be glad to demonstrate the tractor-scraper team that will give *high production at low cost* on your operation. Call him today.

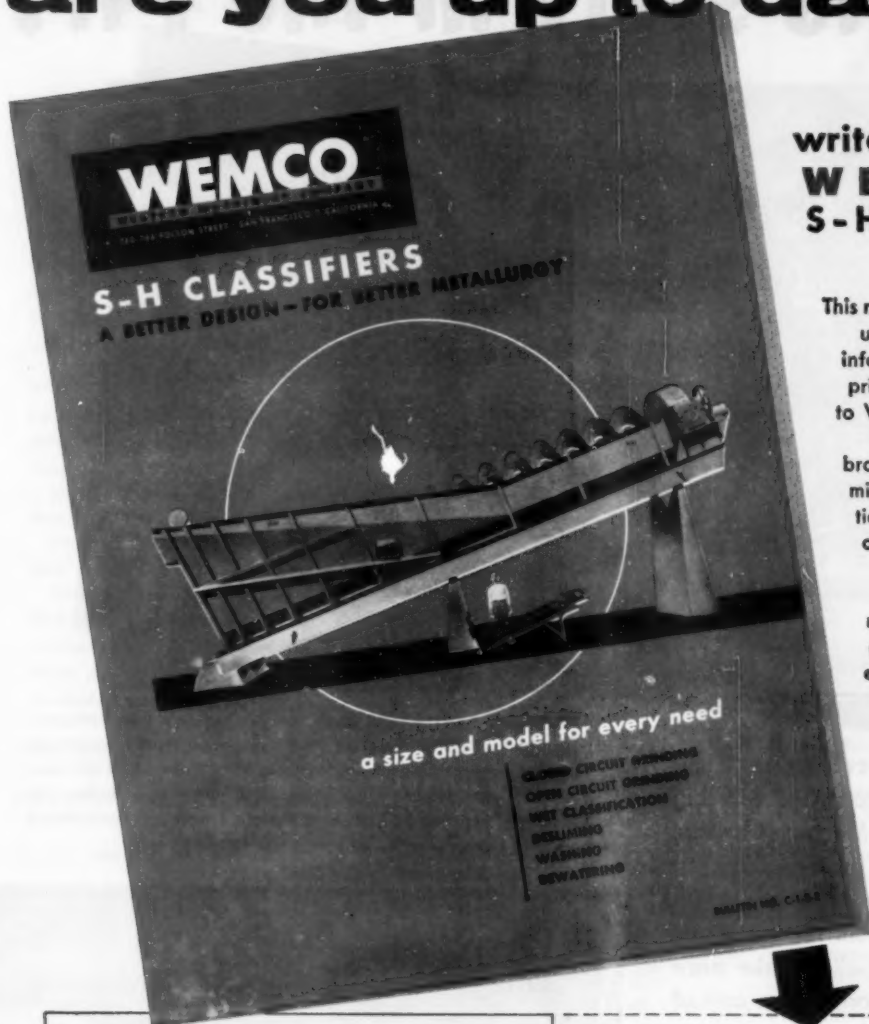
Caterpillar Tractor Co., San Leandro, Cal.; Peoria, Ill., U.S.A.

CATERPILLAR*

*Both Cat and Caterpillar are registered trademarks—®

**NAME THE DATE...
YOUR DEALER
WILL DEMONSTRATE**

are you up to date?



write for the new **WEMCO** **S-H CLASSIFIER** **BULLETIN**

This new bulletin contains valuable, up to date mineral engineering information on wet classification principles and their application to Wemco S-H Classifier design.

Fully illustrated, this 20 page brochure is designed for use in mineral dressing, coal preparation, aggregate production and other related processing fields.

It provides a store of useful information for ready reference by mine managers, general and mill superintendents, metallurgical and process engineers, design engineers, millmen, students and others.

SUBJECTS COVERED—Here is a sample of some of the important subjects covered in this presentation:

- WET CLASSIFICATION PRINCIPLES
- DESIGN PRINCIPLES
- METALLURGICAL PRINCIPLES
- CAPACITY TABLES
- BALANCED PERFORMANCE
- FIELD APPLICATIONS
- DESIGN SPECIFICATIONS
- OPERATING CONTROLS
- DIMENSIONAL DRAWINGS
- PROPER CHOICE OF MODELS
- SHIPPING WEIGHTS AND VOLUMES
- OPERATING FORMULAE

WEMCO

WESTERN MACHINERY COMPANY

760 FOLSOM STREET SAN FRANCISCO 7, CALIFORNIA

REPRESENTATIVES IN PRINCIPAL CITIES OF THE UNITED STATES AND CANADA AND IN OTHER COUNTRIES THROUGHOUT THE WORLD

WRITE NOW—just fill in coupon for your free copy of this valuable bulletin. If you would like extra copies for your associates, simply tell us how many. No obligation, of course.

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Profits start in the Pit!



Their dependable performance and high job availability, combined with big payload capacity and fast travel speeds, have made "Eucs" the preferred hauling equipment for open pit mines and quarries. Because they're built for tough off-the-highway service, Euclids make more profits for owners by cutting the cost of hauling stone, ore, overburden and waste material.

Your Euclid distributor can show you the way to lower hauling costs... have him provide a hauling production and cost estimate for your operation... there's no obligation, of course, so get in touch with him soon.

EUCLID DIVISION
GENERAL MOTORS CORPORATION
Cleveland 17, Ohio

There are over 1200 "Eucs" on Minnesota's Iron Ranges— more than all other makes of off-the-highway trucks combined! Rear-Dumps, ranging in payload capacity from 15 to 50 tons, work the year around hauling ore and heavy overburden. On this tough "proving ground" Euclid performance has consistently paid off in more production and lower hauling costs.



Working at a large open-pit copper mine in Arizona, a fleet of 34-ton "Eucs" maintain high production at low operating and maintenance cost. Their dependable performance and high job availability make "Eucs" an important part of the profit picture on this and many other mine and quarry operations throughout the world.



Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE

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Mining World

Including the Export Edition WORLD MINING

Published monthly except in April when publication is semi-monthly

Volume 17

FEBRUARY 1955

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EDITORIAL AND EXECUTIVE OFFICES

121 Second St., San Francisco 5, Calif., Garfield 1-5887

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MILLER FREEMAN PUBLICATIONS



GREATER FOOTAGE at LOWER COST with Sprague & Henwood's "ORIENTED" Diamond Bits

That's our story in a nut shell and we're proving it every day—not only in our own world-wide contract core drilling operations, but also through the money-saving results being achieved by hundreds of other satisfied users.

After extensive comparative tests had demonstrated to our satisfaction that drill diamonds cut much faster and last much longer when "oriented" in the matrix with their hardest edge or "vector" toward the work, we decided that random setting was both inefficient and wasteful. Since then we have standardized on oriented diamond bits and have produced THOUSANDS — in a wide variety of types and sizes; with both cast- and powdered-metal matrices.

Only selected diamonds of suitable crystalline structure can be used and only specially trained and equipped setters of more than usual aptitude can be relied upon to orient diamonds correctly in the mold, but we are now fully organized for efficient production of ORIENTED DIAMOND BITS, at no additional cost to purchasers.

In terms of footage cost, these are the most economical diamond bits ever produced and we invite inquiries on that basis.

Bulletin 320 illustrates and describes all types and gives complete working data. Write for a free copy and tell us about your diamond drilling requirements. Our experienced executives welcome opportunities to make money-saving suggestions without charge or obligation.

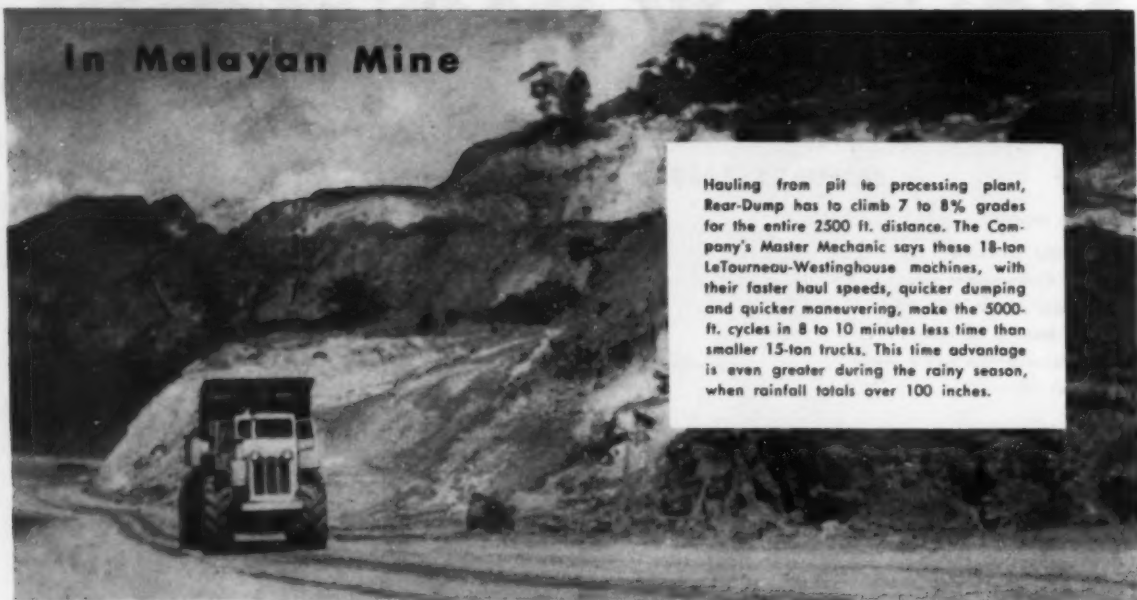
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In Malayan Mine



Hauling from pit to processing plant, Rear-Dump has to climb 7 to 8% grades for the entire 2500 ft. distance. The Company's Master Mechanic says these 18-ton LeTourneau-Westinghouse machines, with their faster haul speeds, quicker dumping and quicker maneuvering, make the 5000-ft. cycles in 8 to 10 minutes less time than smaller 15-ton trucks. This time advantage is even greater during the rainy season, when rainfall totals over 100 inches.

Two 18-ton Tournapull Rear-Dumps produce as much as four 15-ton trucks

Eastern Mining and Metals Co. produces over a million tons of high grade iron ore annually at their Dungun Mine on the East Coast of Malaya. Daily production includes 2,000 tons of washed ore. Formerly, all hauling from pit to 2 crushers, and from pit to washing plant, was handled by nine 15-ton trucks. Then, the firm purchased two 18-ton Tournapull Rear-Dumps. Their Mine Superintendent reports these results:

Reduce haul time 50%

Working the same 2500-foot one-way hauls as the trucks, and climbing the same 7 to 8% grades, the Tournapull Rear-Dumps make the round trip in *only half the time* it takes the trucks. One reason is they dump faster! Rear-Dump bowl lifts instantly at the touch of an electric switch. There is no wait for hydraulic pressure to build up. A second reason for the faster cycle time is that Tournapulls spot more quickly at the shovel and at the crusher, and they turn in less space! These LeTourneau-Westinghouse units can turn around non-stop in a space only 21 ft. wide. Trucks need a space at least 61 ft. wide to complete the same non-stop 180° turn.



Rear-Dump gets capacity 18-ton load of iron ore in 4-5 passes of the 2½-yd. shovel. Low entry from rear, big bowl target, speed shovel swings, reduce spillage.

As a result of all these factors, each 18-ton Tournapull hauls as much iron ore as two of the 15-ton trucks.

Tournatractor speeds cleanup

Eastern Mining also reports "highly satisfactory service" from their new Tournatractor (LeTourneau-Westinghouse's tractor on rubber tires). This 208 hp unit is being used for cleanup around the power shovels in the pit and for stripping overburden. Like

the Tournapull, it is controlled electrically. Because of simplicity of operation, untrained laborers have become skilled operators in a few days.

Find out more

Let us show you more about these dependable rubber-tired machines. We will gladly help you make production and cost estimates, or arrange to let you see these earthmovers in action.

Tournapull—Trademark Reg. U.S. Pat. Off.
Tournatractor—Trademark RT-678-M-bw



LeTourneau-Westinghouse Company

PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

[World Mining Section—4]

MINING WORLD



Tractor parts rebuilt with AMSCO LEADER AUTOMATIC ELECTRIC WELDER

Save contractor \$10,000 over replacement parts, double service life

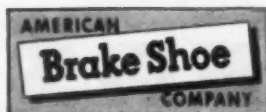
If you operate track-type equipment, here's an automatic electric welder that is a *must* for your maintenance shop. It will save you time and money, and radically increase service life of your present equipment.

See what it did for one construction outfit:

Operating five large track-type tractors, each with 12 bottom rollers, 4 carrier rollers, 156 track links, 78 grouser pads, 2 idlers,

2 sprockets and one dozer blade, replacement cost was figured to be approximately \$13,800. Rebuilding these parts with the Amsco Leader cost approximately \$3,700, or a saving of about \$10,000. Plus the fact that the rebuilt parts gave nearly double the effective service life of the new parts.

See your local Amsco Distributor today. Ask him for complete details on the Amsco Leader. See for yourself how a new Amsco Leader can save you thousands of replacement dollars.



AMERICAN MANGANESE STEEL DIVISION
Chicago Heights, Ill.

How mine operators can take full advantage of Allis-Chalmers Dealer Service Plan to help protect profits

BENEFITS: Better performance • More time on the job • Longer equipment life • Lower maintenance cost • Higher resale value

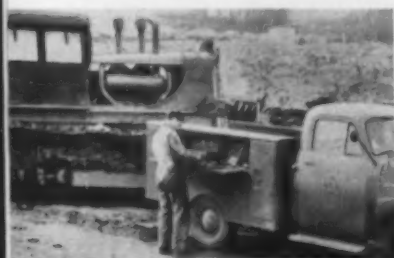
Experience has convinced many mine operators that the Allis-Chalmers Dealer Service Plan is geared to keeping equipment operating efficiently. They have found that taking full advantage of such service is easy, and that it pays big dividends. Here's why.

Allis-Chalmers dealers offer them a *planned* approach to service, right from the day their equipment is delivered. It covers everything from service schools to lubrication schedules, and from parts to preventive maintenance.

You owe it to yourself to take a look at the advantages this service plan offers. Then see your nearby Allis-Chalmers dealer soon and ask him to give you all the facts.



PREVENTIVE MAINTENANCE TRAINING KITS — movies, slides, charts and literature — are available for helping you train your own personnel. Your Allis-Chalmers dealer will present it for you at your convenience or arrange to have a factory man do the job.



FAST PARTS SERVICE. Factory-built Allis-Chalmers parts are stocked in quantities by the *dealer*, to give you parts service close to your job. Experienced equipment men agree it pays to use only standard factory-built parts.



SCHEDULED CHECKUP PROGRAM — Your Allis-Chalmers dealer will help you plan a schedule for all maintenance work. You'll save excessive repair bills, avoid costly downtime and get far better performance, longer life from your machines.



OPERATING TIPS — Allis-Chalmers dealer servicemen are trained to give your operators all the facts they need to operate equipment most productively — for example, how to recognize when adjustments should be made.



SPECIALIZED FACILITIES at your Allis-Chalmers dealer include factory-approved tools and all necessary service equipment. Factory-approved methods are used to save you time and money, assure finest workmanship.



FACTORY-TRAINED DEALER SERVICEMEN have the specialized experience to help you spot trouble symptoms fast, help you prevent costly breakdowns. Their training never stops; they make it a *policy* to stay abreast of every development.



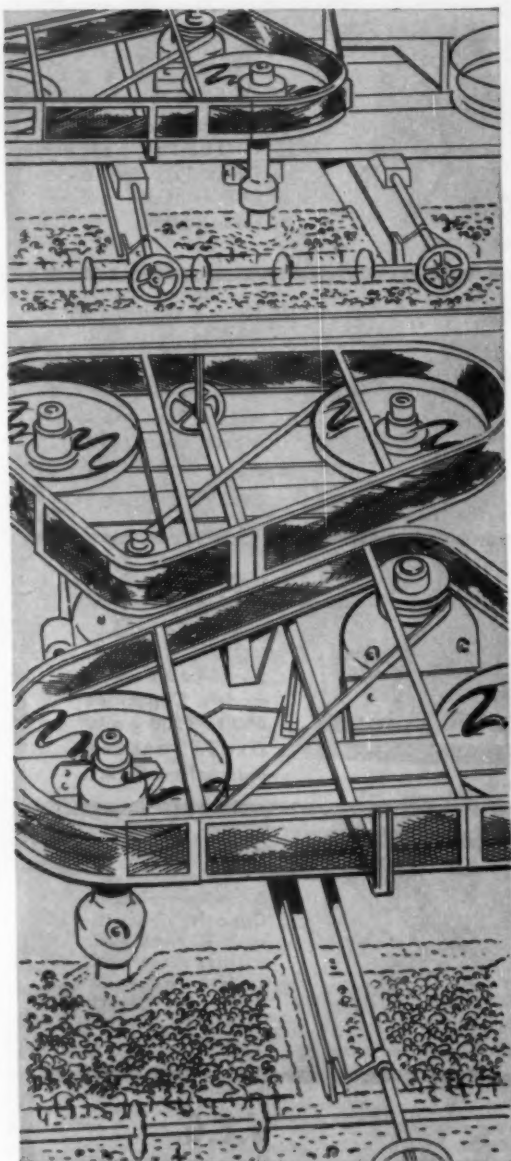
FACTORY SERVICE SCHOOL TRAINING is open to your operators and servicemen just as it is for Allis-Chalmers dealers. Your men discover that Allis-Chalmers design simplicity makes the equipment easy to learn . . . easiest of all to service.

ALLIS-CHALMERS

TRACTOR DIVISION — MILWAUKEE 1, U. S. A.



MORE COLLECTOR FOR YOUR MONEY...



Dow Xanthate Z-11, as recommended by our Mining Technical Service,
can give you better metallurgy at lower cost

Get rid of those complex collector combinations, by replacing them with Dow's new Xanthate Z[®]-11 and proper pulp conditioners, with the help of our Mining Technical Service group. You can actually *reduce* collector consumption while *increasing* metal recovery.

This sodium isopropyl Xanthate is a powerful general purpose collector for improved flotation of all sulfides including pyrite. Since Xanthate Z-11 is substantially nonfrothing, it makes possible

more exact, independent control of collector and frother.

And if excessive frother consumption has you worried, Dowfroth[®] 250 can cut that cost by 50%—has done even better than that in some mill operations while producing improved metallurgy.

For many years, Dow has helped promote flotation economy through research. For consideration of your problem, or samples of dependable Dow reagents, write to THE DOW CHEMICAL COMPANY, Midland, Michigan, Dept. OC 815J.

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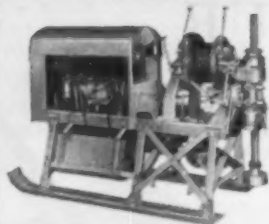
BBS-1

World's best known surface drill. Handles "E" rods to 1000 ft. "A" to 800 ft.



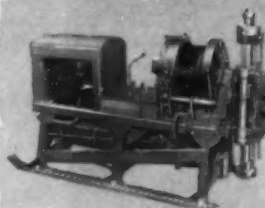
X-RAY

Compact, portable - - 185 lbs. net. Takes 3/4" core to 200 ft. Low fuel consumption.



BBS-2

Versatile, choice of 5 swivelheads. Depths to 2400 ft. Gas or diesel.



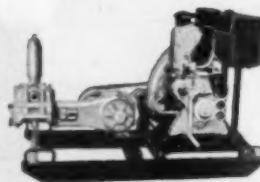
BBS-4

Drills to 5000 ft. with "B" rods. Moves under own power. Gas or diesel.



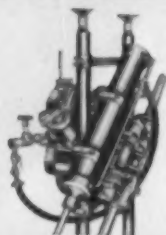
PERMASET BITS

(Powdered metal). All standard sizes available from stock. Also reaming shells, etc.



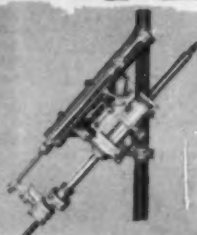
DRILL PUMPS

5-12 and 4-7 models. Capacities 400 to 1200 g.p.h. Diesel motor optional on 5-12.



BBU-2

Rugged. Capacity, 1800 ft. with "E" rods, 1400 with "A". Four gear feeds.



J.V.

4 feed swivelhead. Capacity 800 ft. with "E" rods. JVR with reverse and righthand feed screw for blast-holes.

It's for
DIAMOND DRILLING
We make it!

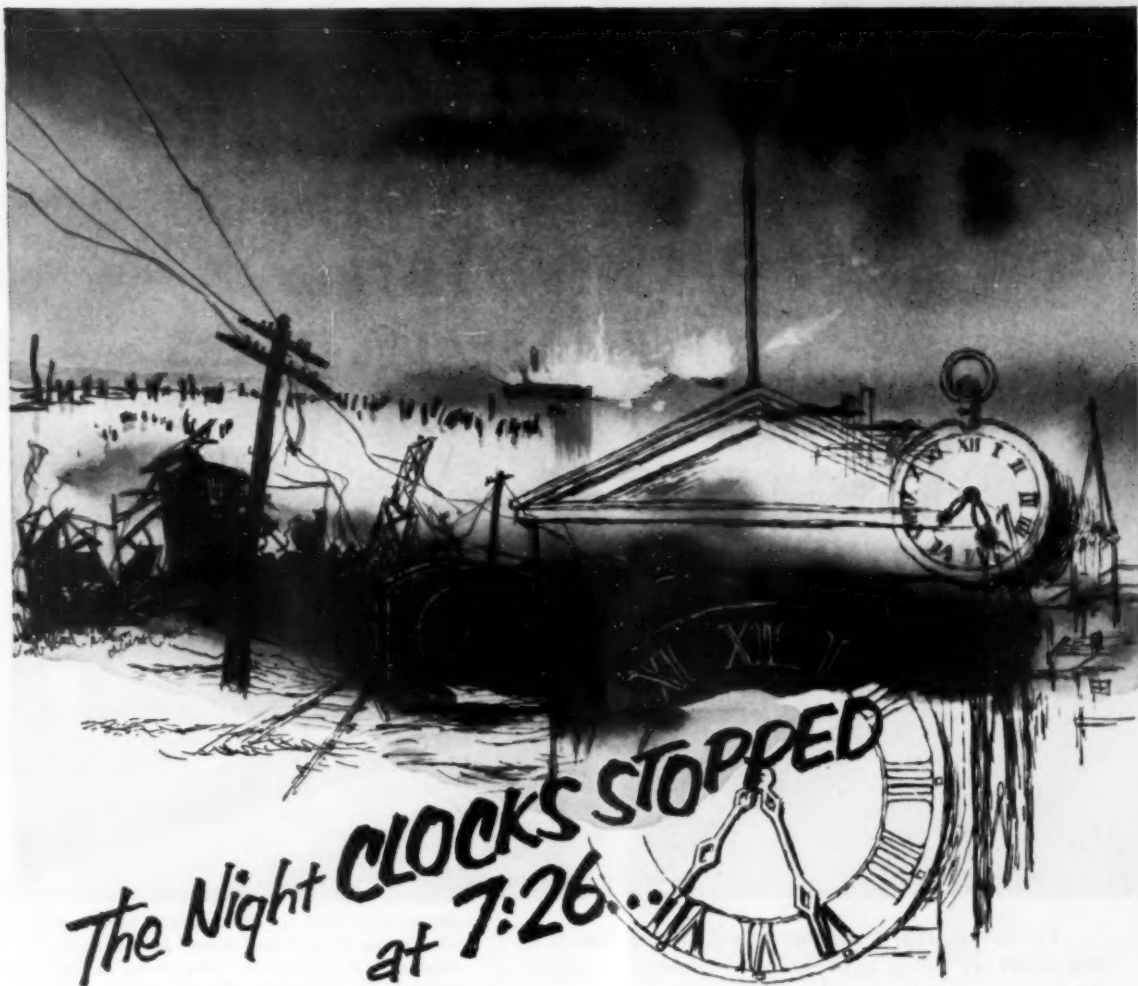


V.E.G.

Vane motor powered version of J.V. Lightweight, compact construction. Can be speedily dismantled into two convenient units.

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BOYLES BROS
DRILLING COMPANY LTD.
VANCOUVER, CANADA



Some 9,500 people were in South Amboy, N. J., that drizzly evening in 1950. At the waterfront, longshoremen were transferring the last of 12 freight cars of ammunition to lighters that would carry it to a waiting vessel in Raritan Bay.

But the City Hall clock never got to 7:27—and the freighter's deadly cargo never got loaded. Explosions shattered windows over a

radius of 12 miles; and hundreds of people looked at their arms and legs and saw that flying daggers of glass had stabbed them.

At dawn, 312 of the injured had been counted.

* * *

Such disasters have happened many times before in America. They could happen again. And if they do—and when they do—there must be blood plasma on hand to take care

of the injured. For blood saves lives!

But blood cannot be mined or manufactured. It must come from the veins of healthy men and women. Men and women who feel concern for a suffering neighbor. So give blood—now!

Whether your blood goes for Civil Defense needs, to a combat area, or to a local hospital—this priceless, painless gift will some day save an American life!



**Give
Blood
Now**

**CALL YOUR
RED CROSS TODAY!**

National Blood Program

Business Executives!
✓ Check These Questions!

If you can answer "yes" to most of them, you—and your company—are doing a needed job for the National Blood Program.

- ☐ Have you given your employees time off to make blood donations?
- ☐ Do you have a Blood Donor Honor Roll in your company?

- ☐ Have you set up a list of volunteers so that efficient plans can be made for scheduling donors?
- ☐ Have you arranged to have a Bloodmobile make regular visits?
- ☐ Has your management endorsed the local Blood Donor Program?
- ☐ Have you informed employees of your company's plan of co-operation?

- ☐ Was this information given through Plant Bulletin or House Magazine?

- ☐ Has your company given any recognition to donors?
- ☐ Have you conducted a Donor Pledge Campaign in your company?

Remember, as long as a single pint of blood may mean the difference between life and death for any American . . . the need for blood is *urgent!*

Laboratory, field tests prove superiority of **NEW JEFFREY** **"PERMASEAL" IDLERS**



The new double flexible seals on Jeffrey PERMASEAL Belt Idlers are hailed as the greatest advance in conveying engineering in the last 20 years.

Laboratory and field tests have proved these flexible contact seals keep dirt out and grease in *for the life of the idler*. These seals have been tested with outstanding results under greatly accelerated conditions of wet sand, dry sand and airborne dust in our Research Laboratory. Field tests (such as the large installation above) are demonstrating the merits of PERMASEAL idlers in conveying iron ore, coal, stone and foundry sand.

Jeffrey PERMASEAL Belt Idlers with new double flexible seals are available in all types and sizes. They will vastly improve your complete conveyor operations.

WRITE FOR TECHNICAL INFORMATION AND ESTIMATES

Above: Installation of Jeffrey PERMASEAL Belt Idlers at the Pennsylvania Railroad's new Philadelphia ore dock. Twin 54" belts convey an ultimate capacity of 10,800 TPH. Each belt travels 80' to top of terminal house at rate of 500 FPM.



Airborne-dust test in Jeffrey Research Laboratory (unretouched).



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MOUNTAIN MOVERS

uncovering iron ore



MARION 191-M

The world's largest shovel on 2 crawlers



MARION 151-M

Teams effectively with 25-ton trucks

● When stripping problems take on mountainous proportions, these two MARION machines can reduce them to molehills — both as to the time and the costs involved in doing the job.

These MARION machines, shown in action at a western mine, have a steady diet of hard digging and loading. The 191-M with its 10 cubic yard

dipper loads the biggest trucks in a few fast passes. The 151-M teams efficiently with trucks in the 25-ton class.

Get the details about the records of these MARION machines, as to daily output, dependability in heavy-duty digging and operating costs. You'll see why more of the tougher jobs are being done with MARION machines.



MARION • OSGOOD • GENERAL

MARION POWER SHOVEL CO. • MARION, OHIO, U. S. A.

A Subsidiary of Merritt-Chapman & Scott Corporation



POWER SHOVELS FROM ½ TO 60 CUBIC YARDS
PILE DRIVERS • WALKING DRAGLINES



DRAGLINES • CLAMSHELLS • CRANES • BACKHOES
TRUCK CRANES • MOBILCRANES • LOG LOADERS

Your Confidence Is Justified / Where This Flag Flies

Front-wheel drive, big air brakes, plus the rear dumping action, make it easy for the operator to dump his entire load cleanly and safely over edge of soft spoil bank.



During construction of ramp, haulers' big 21.00 x 25 low-pressure tires tightly compact fill, eliminate sink-holes experienced when ramps were built by crawlers and pans.



Stripping costs reduced more than 30% with new-type haulers

Kleenbirt Collieries had always hired crawlers and scrapers to strip overburden from their coal beds northeast of Lethbridge, Alberta. Looking for a way to lower costs, the Company in 1952 bought 3 C Tournapull Rear-Dumps and a 3½-yd. stripping shovel.

In their first full season (April to November), this team accounted for 578,000 yds. of overburden, sandstone and shale. In the first 3 months of the following season, working a shorter day, the units hauled 112,000 bank yards. Per-yard costs were *less than 35% of the cost of the last year crawlers were used*, and 30% less than *any of the 10 previous years when crawlers were used*. These costs include depreciation and interest on the equipment investment.

Haul up 9½ to 12½ % grades

To date, the Rear-Dumps have spent about half their time hauling the dirt and shale overburden pictured, the other half hauling shot sandstone and coal. Loads in clay, earth and shale average 12 bank yards . . . in rock, 9 bank yards. Maximum grades vary from 9½ to 12½%. "These 18-ton LeTourneau-Westinghouse Rear-Dumps are ideal for work with a 3½-yd. shovel," says Foreman W. E. Herrick. "They are the best hauling units for our kind of work."

Rear-Dumps build ramps

One of their most important jobs according to Herrick, is building ramps. Constructed of overburden, these connect pit with spoil pile and coal haul roads. They average 50' wide, 50' high, and 250' long. Not only was their construction long and costly with crawlers and scrapers, but necessary compaction could never be achieved. This caused bad sink-holes to develop. "Now," says Herrick, "with a crawler for leveling and Tournapull Rear-Dumps for hauling, we build the ramps much faster. Also, we get better compaction and no sink-holes."

A demonstration on *your* work will show you specifically the many ways LeTourneau-Westinghouse Rear-Dumps can cut haul costs. Call us today to arrange time and place.

Recently, Westinghouse Air Brake Company purchased from R. G. LeTourneau, Inc. their earthmoving and related products together with their Peoria, Toccoa, and Australian factories. Adding the high quality standards, precision manufacturing experience, and research facilities of Westinghouse Air Brake to the earthmoving developments of LeTourneau, gives you assurance that the improved line of equipment offered by this strong new company is the finest on the market.

Tournapull—Trademark Reg. U.S. Pat. Off. R-565-M



LeTourneau-Westinghouse Company

PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

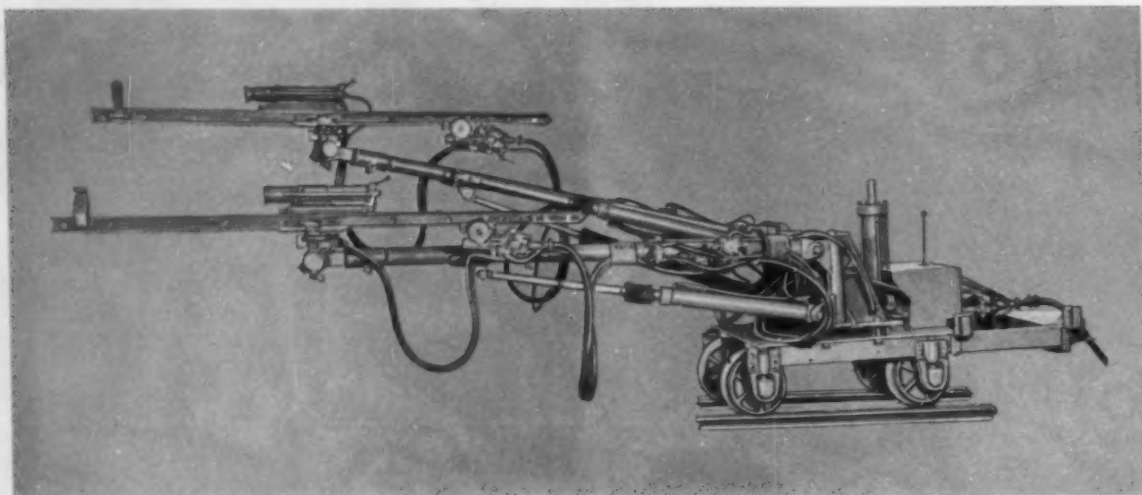


18-ton LeTourneau-Westinghouse Rear-Dump is loaded with 4 passes of 3 1/2-yd. shovel.

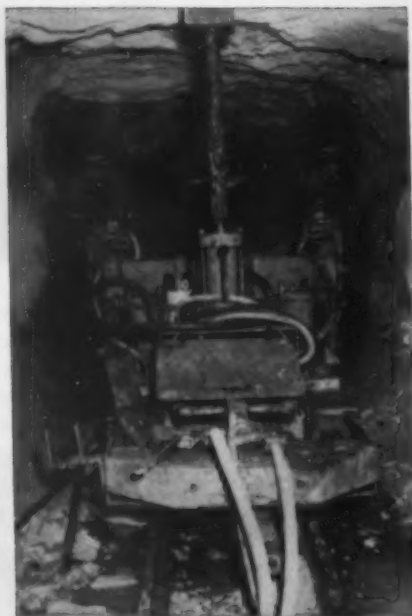
Kleenbirm Collieries has been mining coal here since 1919. Seam now being uncovered is 4 1/2 ft. thick. Overburden, mostly shale and clay, is 30 ft. thick. When winter stops mining,

LeTourneau-Westinghouse units haul stockpiled coal to loading bunkers located 1 1/2 miles from pit. From here, coal is hauled by truck to nearby towns.





"Can't find anything to beat the **JOY** **JIB JUMBO"**



Thus reports a mine operator who has "tried 'em all." He rated the Joy Jib Jumbo tops in drilling speed, safety, and driller comfort.

He found that only the Joy Jib Jumbo had *all* these features:

- * Jibs are hydraulically actuated for faster, more flexible operation, and for greater rigidity when in place for drilling.
- * Drills are operated by remote control which allows operator to stand well back from the face.
- * Permits use of long chain feeds and long-wearing carbide insert bits.
- * Speed in setting up and tearing down—hydraulic roof jack which brakes wheels in the only setting-up operation.

The versatility of the Joy Jib Jumbo and the variety of models available makes it applicable to your mining plans. Why not see for yourself today. Write for Bulletin 87-F to **Joy Manufacturing Company** Oliver Building, Pittsburgh 22, Pa. In Canada: **Joy Manufacturing Company (Canada) Limited**, Galt, Ontario.



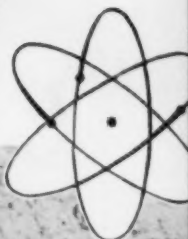
Consult a Joy Engineer

for AIR COMPRESSORS, ROCK DRILLS,
HOISTS, AND SLUSHERS



Another **P&H** "first"

Electronic Control!



P&H Model 1800 (8 Cu. Yd. Capacity)

a great forward step in Electric Shovel performance



ELECTRONIC CONTROL — using grid control thyatron tubes for the first time on any electric shovel. Applied to all operating motions! Results in finer performance characteristics . . . more rapid response . . . better co-ordination for the operator . . . from 5% to 10% faster cycle. Thoroughly proved in more than 5 years of field installations as well as on military aircraft and combat vessels. Now standard equipment on all P&H Electric Shovels — ready to give you increased production, lower tonnage costs!

THE 1000th MAGNETORQUE*! The most highly advanced means of power transfer yet developed —

now proved on P&H Shovels in the most severe types of service. Here's smoother operation, extra power, greater bail pull. Electromagnetic operation makes it friction-free, wear-free, worry-free! Magnetorque lasts the life of the shovel.

ONE RESPONSIBILITY. All electrical equipment on P&H Electric Shovels is designed and built specifically for shovel service — not adapted for it. And P&H, the builder, takes the entire responsibility for service. There's no buck-passing among suppliers. P&H service is tailored to your needs.

Write for complete information.

*T.M. of Harnischfeger Corporation for electro-magnetic type coupling.

P&H ELECTRIC SHOVEL DIVISION

HARNISCHFEGER CORPORATION
MILWAUKEE 46, WISCONSIN

the **P&H** Line



TRUCK CRANES



DIESEL ENGINES



POWER SHOVELS



PREFABRICATED HOMES



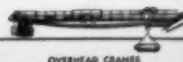
HOISTS



SOIL STABILIZERS



WELDING EQUIPMENT



OVERHEAD CRANES



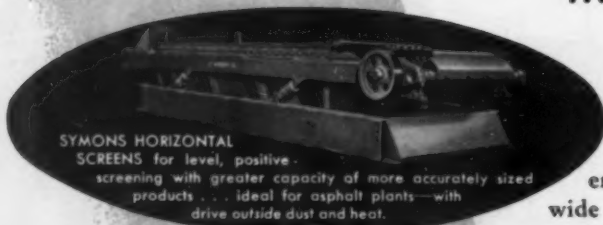
SYMONS VIBRATING ROD GRIZZLIES
for heavy duty big capacity
scalping from $\frac{1}{2}$ " up to
about 4".



SYMONS VIBRATING BAR GRIZZLIES
for heavy duty large capacity
primary scalping from $1\frac{1}{2}$ "
upwards.



**SYMONS VIBRATING ROD DECK
SCREENS** for low cost, big capacity
screening of wet and
sticky material.



**SYMONS HORIZONTAL
SCREENS** for level, positive
screening with greater capacity of more accurately sized
products... Ideal for asphalt plants—with
drive outside dust and heat.



SYMONS "V" SCREENS for big capacity single cut wet or dry separations—even in much finer meshes than possible with conventional screens.

SYMONS[®] SCREENS

... from the **HEAVIEST SCALPING**
... to the **FINEST SCREENING**

● **SYMONS VIBRATING SCREENS**
have been serving the non-metallic minerals industry for almost twenty years. The wide range of types and sizes enables you to select the *right* screen for your particular application.

These quality screens have gained an enviable reputation for dependability, efficiency and economy... backed by the same high standards of accuracy, design and workmanship, and the same advanced engineering that is used in the manufacture of all Nordberg Machinery.

Mail the coupon for further details.

SYMONS... A Registered Nordberg Trade-mark Known Throughout the World

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MACHINERY FOR PROCESSING ORES and INDUSTRIAL MINERALS
NEW YORK • SAN FRANCISCO • DULUTH • WASHINGTON
TORONTO • MEXICO, D.F. • LONDON • JOHANNESBURG

MAIL THIS COUPON TODAY

NORDBERG MFG. CO., Milwaukee, Wisconsin MW

Please send me further information on the following screens for coal preparation service:

- ☐ Symons Horizontal Screens ☐ Symons "V" Screens
☐ Symons Rod Deck Screens ☐ Symons Grizzlies

Name _____ Title _____

Company _____

Address _____

City _____ Zone _____ State _____

\$254



Cyanamid

REAGENT NEWS

"ore-dressing ideas you can use"

AEROFROTH® 80 Frother

Improves Copper, Silver Recovery

Recent tests showing approximately 3% increase in both copper and silver recovery at a Mexican flotation plant prompted adoption of AEROFROTH 80 Frother in place of cresylic acid. At this property silver occurs in pyrite as well as with copper-bearing sulfides. A bulk float recovers both minerals.

During a recent six-day plant test, cresylic acid was used on one bank of cells, AEROFROTH 80 on the other bank. Both were fed at the rate of 0.15 lb. per ton of ore. Other reagents used are 0.5 lb. soda ash, 0.28 lb. AEROFLOAT® 242 Promoter and 0.2 lb. potassium ethyl xanthate per ton of ore. Results were:

	Cresylic Acid				AEROFROTH 80 Frother			
	Assay		% Recovery		Assay		% Recovery	
	Oz/Ton				Oz/Ton			
	% Cu	Ag	Cu	Ag	% Cu	Ag	Cu	Ag
Head	4.29	4.41			4.88	4.74		
Concentrate	28.78	28.53	93.98	90.64	28.55	27.19	96.23	93.38
Tailings	0.30	0.50	6.02	9.36	0.22	0.38	3.77	6.62

The Cyanamid Field Engineer who worked with this operator reports:

"Higher recoveries with AEROFROTH 80 were due to more rapid flotation. The bank of cells fed AEROFROTH 80 carried practically no mineral to the last cell, flotation being complete in the preceding cells. With cresylic acid, sulfide flotation

was considerably slower. The froth in the last cell carried considerable mineral".

A Cyanamid Field Engineer will be glad to work with you to determine whether AEROFROTH 80 Frother or other Cyanamid Reagents can increase recovery or cut costs on your mill. A note to our nearest office will have prompt attention.

AMERICAN Cyanamid COMPANY

MINERAL DRESSING DEPARTMENT

30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

Cable Address — Limenitra, New York

NORTH AMERICAN CYANAMID LIMITED
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E. P. CADWELL, Casilla 12983,
Correo 11, Santiago, Chile
G. B. O'MALLEY, MALCOLM GLEN,
377 Little Collins St., Melbourne C.1, Australia



Why this conveyor is easy on belts

PERFECT ALIGNMENT is the answer . . . and far less belt replacement is the result.

First, PIONEER Continuflo Conveyors are jig-built at the factory, with joint frames between the sections to keep them straight and true.

Second, Head and tail pulleys are of large diameter to prevent belt slippage.

Third, Flexible rubber impact idlers absorb shock of falling materials, thus reducing cutting and wear of belt.

Fourth, Specially-designed self-aligning troughing idlers, in addition to forward tilt of regular idlers, hold belt in line.

Fifth, New-type self-cleaning rubber return idlers virtually eliminate build-up of abrasive materials on roller.

Sixth, Rollers and idlers turn easily. Anti-friction bearings are used throughout. This also cuts power requirement.

Needs fewer support towers

Another outstanding feature of PIONEER Conveyors is their extra strength and rigidity. Angle iron construction, welded vertical and diagonal braces, and upper and lower chords tied together with lattice-frame construction make it possible to space support points as far apart as 40 feet.

It's easy to assemble PIONEER conveyors because no section is over 10' in length. Head and tail sections are specially built to meet your H.P. requirements.

TONS PER HOUR DELIVERED BY PIONEER CONVEYORS*

Belt Width	Belt speed in feet per minute			Maximum lump size	
	300'	400'	500'	Sized	Unsize
18"	156	—	—	4"	6"
24"	276	368	—	6"	8"
30"	432	576	720	7"	12"
36"	624	832	1040	8"	16"

*Based on material weighing 2700 lbs. per cubic yard.



PIONEER Mesabi-type impact idler



PIONEER Rubber roll self-cleaning return idler.

PIONEER Self-aligning troughing idler



Ask your conveyor salesman these questions

1. What type of bearings are used?
2. Are they located on through shafts?
3. How many support towers will be necessary?
4. What's the approximate cost of assembling and erecting?

For helpful 52 page book telling how to select the right conveyor for YOUR job, write Pioneer Engineering Works, Inc., Minneapolis 13, Minn. (subsidiary of Poor & Company, Chicago) or nearest PIONEER Distributor.

BUY BOTH!
HIGHER OUTPUT
LOWER UPKEEP

Pioneer

Continuflo EQUIPMENT

Pioneer Engineering Works, Inc., 1515 Central Ave. Minneapolis 13, Minn.
Subsidiary of Poor & Company • Chicago

Please send information on equipment checked.

- | | | |
|--|--|--|
| <input type="checkbox"/> GRAVEL PLANTS | <input type="checkbox"/> WASHING PLANTS | <input type="checkbox"/> MECHANICAL FEEDERS |
| <input type="checkbox"/> ROCK PLANTS | <input type="checkbox"/> BITUMINOUS PLANTS | <input type="checkbox"/> VIBRATING SCREENS |
| <input type="checkbox"/> JAW CRUSHERS | <input type="checkbox"/> APRON FEEDERS | <input type="checkbox"/> BUZZER SCREENS (LIGHT DUTY) |
| <input type="checkbox"/> ROLL CRUSHERS | <input type="checkbox"/> GRS FEEDERS | <input type="checkbox"/> CONTINUFLD CONVEYORS |

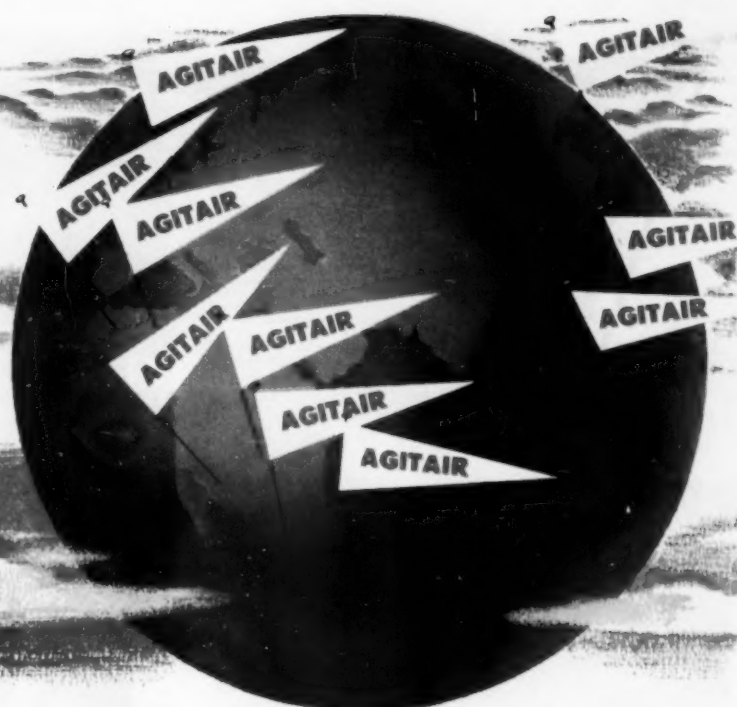
Name _____

Company _____

Address _____

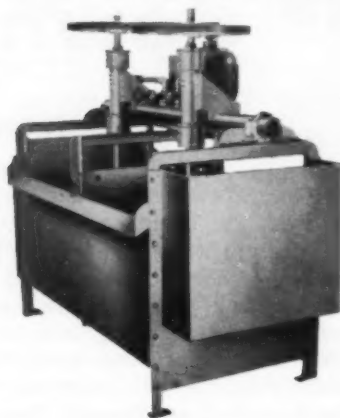
City _____ Zone _____ State _____

AGITAIR IS THERE!



You can choose with assurance..the Flotation Machine so successfully used in mining centers throughout the world

Agitair Flotation is used in so many farflung places because it adapts so readily and efficiently to the varied problems of ore beneficiation encountered in the field of metallurgy. Flexibility is the key to its remarkable success. Its mill application to all basic metals is now engineering routine. Its capacity to meet unusual demands is a challenge it welcomes.



Planned to fit the plant

Cell capacities and connected unit assemblies meet the physical requirements of all mills . . . large or small. Its recovery quotient is high . . . its power consumption low. Simple design and rugged construction insure long, trouble-free use. For complete information on AGITAIR, write your request today.

Leaders in Experience & Service

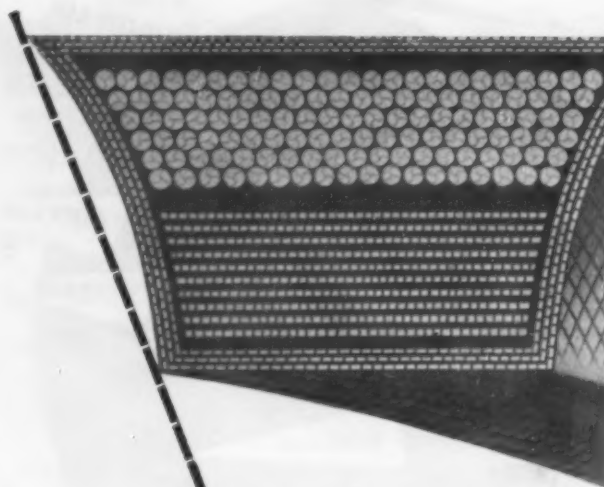
HOME OFFICE
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Agents In All Principal
Foreign Mining Districts

THE GALIGHER co.

**CONSULTATION • ORE TESTING
PLANT DESIGN • GEOLOGIC INVESTIGATION**





Shock and vibration are absorbed by this Gates Vulco Rope Drive on the ball mill in a New York rock crushing plant, saving over \$600 a year in maintenance costs. Management gives credit to the resiliency of the Gates Vulco Ropes and to their concave sides for the many years of dependable service they have given.



Concave sides keep belt costs down!



Industry is saving thousands and thousands of dollars every year by specifying Gates Vulco Ropes—the V-Belts with *concave sides* (U.S. Pat. No. 1813698).



Here's the interesting reason *why* Gates belts save money:

On the bend around the sheave the *precisely engineered* concave sides (Fig. 1) of the Gates belt fill out and become straight (Fig. 1-A). Thus the belt makes uniform contact with the sides of the pulley. That means sure pulling power and *even distribution of wear*. Longer wear, fewer replacements cut belt costs...reduce down time...contribute to profits.



Simple test proves value of concave sides



Bend a straight-sided belt (Fig. 2) and feel the sides *bulge out* around the bend. The bulging sides prevent the belt from fitting evenly in the pulley groove (Fig. 2-A). Uneven contact causes uneven wear...shortens belt life...increases costs.

Keep belt costs *down* by specifying Gates Vulco Rope Drives—the V-Belt with *concave sides*. Belts you need are readily available from nearby distributor stocks. The Gates Rubber Company, Denver, Colorado—*World's Largest Maker of V-Belts*.

Gates Engineering Offices and Distributor Stocks are located in all industrial centers of the United States and Canada, and in 70 other countries throughout the world.

TPA 25-0

GATES VULCO ROPE DRIVES

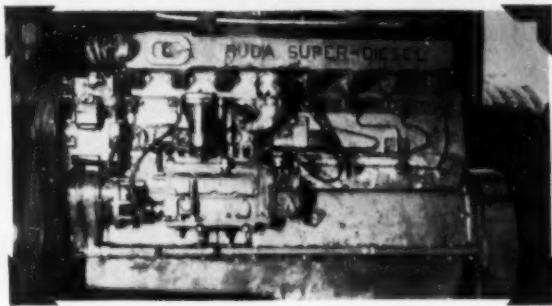
THE ENGINEER'S REPORT

	DATA
LUBRICANT	RPM DeLo Oils
UNITS	21 Buda diesel engines
OPERATION	Hauling ore
CONDITIONS	Heavy duty— 8-15% grades
PERIOD	6 years
FIRM	Bagdad Copper Corp., Bagdad, Arizona

No stuck rings in 21 engines in 6 years hauling ore!



HAULING 22-TON LOADS up 8 to 15% grades out of the Bagdad Copper Corp. open-pit mine, 21 Buda diesels have had no stuck rings, no clogged ring grooves since using RPM DELO Special Lubricating Oil for



the last 6 years. Engines operate 2 shifts a day, 6 days a week in heavy abrasive dust. Torn down after 7000 hours, all parts in the engine above were exceptionally clean and all bearings were good.



BIGGEST OFF-HIGHWAY TRUCK IN THE WORLD (above) was recently built for Bagdad Copper Corp. It weighs 96,000 pounds, hauls 75 tons. RPM DELO Special Lubricating Oil was also selected for its two 350 H.P. supercharged Buda diesels because of the excellent service Bagdad has had from this oil.

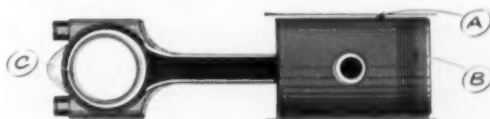


There is an RPM DELO Oil to meet every heavy-duty engine operating condition.

FREE BOOKLET on the RPM DELO Oils gives you complete information. Write or ask for it today.



How RPM DELO Oils keep engines clean and prevent wear

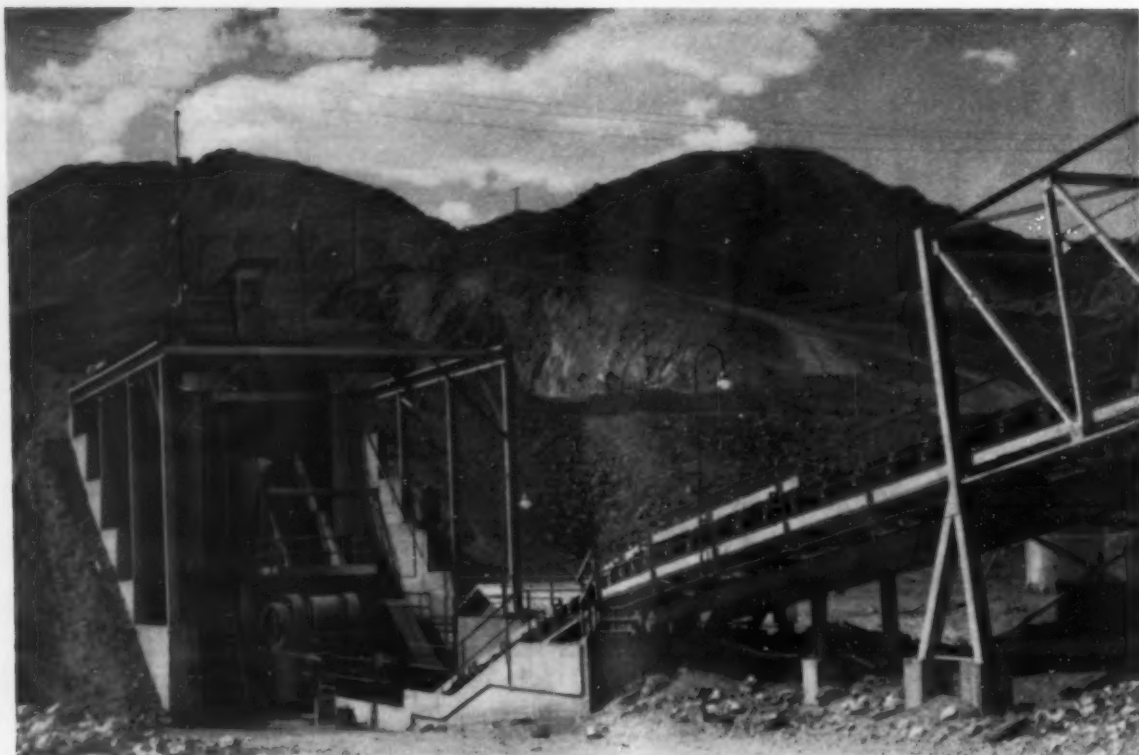


- A. Contain special additives that provide metal-adhesion qualities...keep oil on parts whether they are hot or cold, running or idle.
- B. Anti-oxidant resists deterioration of oil and formation of lacquer...prevents ring-sticking. Detergent keeps parts clean, helps prevent scuffing.
- C. Special compounds stop corrosion of any bearing metal, and oil foaming in both wet and dry sump engines.

STANDARD TECHNICAL SERVICE checked this product performance. For expert help on lubrication or fuel problems, call your Standard Fuel and Lubricant Engineer or Representative; or write Standard Oil Company of California, 225 Bush St., San Francisco.

TRADEMARK "RPM DELO" REG. U.S. PAT. OFF.

STANDARD OIL COMPANY OF CALIFORNIA, San Francisco 20 • STANDARD OIL COMPANY OF TEXAS, El Paso
THE CALIFORNIA OIL COMPANY, Barber, New Jersey • THE CALIFORNIA COMPANY, Denver 1, Colorado



LESS TIME OUT FOR MAINTENANCE... Overhead reduced to a minimum WITH TRAYLOR HB JAW CRUSHERS

In scores of installations, Traylor HB Jaw Crushers have proven their ability to cut maintenance costs . . . reduce power requirements and boost production output. Traylor's original curved jaw plates, applying power as a direct crushing force, are mainly responsible for this amazing record. They outlast ordinary plates 3 to 1. Traylor curved jaw plates distribute wear evenly so they retain their original curved shapes indefinitely.

Traylor HB Jaw Crushers are made in a wide range of sizes with feed openings from 36" x 42" to 56" to 72". Capacities range from 120 to 540 tons per hour. Get the facts . . . find out how Traylor HB Jaw Crushers produce greater capacities using less power per ton produced. For the full story send for illustrated bulletin 5105.

TRAYLOR ENGINEERING & MFG. CO.

713 Mill St., Allentown, Pa.

Canadian Mfrs.: Canadian Vickers, Ltd., Montreal, P. Q.



PRIMARY
GYRATORY CRUSHERS



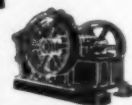
ROTARY KILNS
COOLERS, SLAKERS

SECONDARY
GYRATORY CRUSHERS



GRINDING MILLS

JAW CRUSHERS



APRON AND
GRIZZLEY FEEDERS

SEND FOR BULLETINS
... just mention the Traylor
Equipment that interests you.

SALES OFFICES • NEW YORK • CHICAGO • SAN FRANCISCO

INTERNATIONAL TD-24 CRAWLER strips 6 to 12 feet of overburden to reach the vein. Next step is loosening rock of vein with giant hydraulic ripper mounted on 161 hp. TD-24.



"They Take a Beating But They're Always Back for More"

"INTERNATIONAL Crawlers Out-Perform, Outlast Other
Crawlers in Our Pit," says Texas Iron Ore Miner

Any iron ore mining work is rough on a crawler tractor, but for pure punishment few can match the L. B. Haberle operation in Jacksonville, Texas.

On a 55-acre site on the outskirts of this east Texas town, Haberle is stripping 6 to 12 feet of highly abrasive overburden to reach an 18-inch vein of iron ore used by nearby ready-mix cement plants.

When Haberle's INTERNATIONAL TD-24 completes stripping work, it pulls an hydraulic ripper along the length of the vein. After rock has been loosened, it is loaded out by his INTERNATIONAL DROTT TD-9 Rock Fork bucket.

Haberle has standardized on INTERNATIONAL crawlers for all the heavy work. As he says, "My INTERNATIONAL crawlers get the work done faster, with less cost."

"Since I've had INTERNATIONAL on the job, the production has had a substantial increase with no downtime on these crawlers. The sand used to chew up tracks and rollers on another tractor we had in a matter of weeks. But the INTERNATIONAL crawlers keep right on going without any signs of wear."

"Lots of power and speed, too. I've had all makes of crawlers on my work but it's INTERNATIONAL from now on."

Whatever the job, big or small, a complete line of INTERNATIONAL machines with matched equipment lets you select the single machine or entire spread exactly suited to your requirements. Here's the lineup:

**Eight rugged crawlers from 33 to 200 horsepower
Twenty-six hydraulic and cable-controlled bulldozers and Bullgraders**

Four tractor-drawn scrapers from 10 to 27 cu. yds. heaped capacity

Two high-speed earthmovers

Four INTERNATIONAL DROTT Skid-Shovels from 7/8 to 3 1/2 cu. yds.

Your INTERNATIONAL Industrial Power Distributor will show you how any of these machines can help increase production on your job. Call him today.

INTERNATIONAL HARVESTER COMPANY, CHICAGO 1, ILLINOIS



ORE IS LOADED out by Haberle's INTERNATIONAL DROTT TD-9 Rock Fork bucket. TD-9 picks up ore, shakes out sand, dumps ore into luggers where it is broken up before it is hauled to the crusher.



INTERNATIONAL
INDUSTRIAL POWER

MAKES EVERY LOAD A PAYLOAD

6 MULTICLONE

DUST COLLECTORS

and 4 Western Precipitation COTTRELLS

serve Anaconda at Yerington!

These Cottrells are the newest
Western Precipitation acid mist design

Anaconda selected six Western Precipitation MULTICLONES and four Western Precipitation COTTRELL Electrical Precipitators to handle key recovery operations at its new \$30,000,000 Yerington installation.

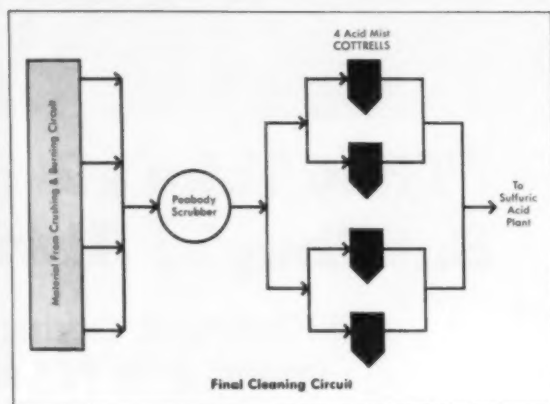
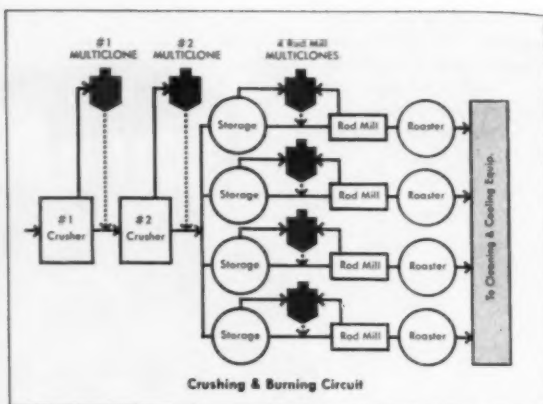
THE 6 MULTICLONES are installed in the sulfur crushing plant where sulfur ore is crushed and ground for use in the Roaster operations. Since this crushing and grinding develops a considerable dust problem, the primary crusher (a jaw type), the secondary crusher (a cone type), and each of the 4 rod mills have an individual 9VG Multiclone Mechanical Collector installed for recovering suspensions from the exhaust gases. So efficient are these Multiclones that the exhaust gases are practically free of all visually discernible dust!

Inasmuch as each crusher and mill has its own Multiclone unit, maximum flexibility in plant operation is achieved—with greatly simplified duct and dampering requirements. Savings in plant maintenance are also obtained by having the Multiclones ahead of the fans so that abrasive dusts are removed and only the clean gas reaches the fan equipment.

The Weed-Heights installation is one more example of the flexibility and adaptability of Western Precipitation recovery equipment to varying operating requirements. Remember — Western Precipitation designs, engineers and installs BOTH electrical (Cottrell) and mechanical (Multiclone) recovery systems — therefore can give an unbiased recommendation on the type best suited to your particular requirements. A wire, letter or phone call to our nearest office places this unmatched "know-how" at your service!

Send for helpful literature!

® "Multiclone"



THE 4 COTTRELLS are installed in the acid plant process to electrically precipitate the acid and water mist from the SO_2 gas generated in the Fluosolid Roasters. From the Cottrells the gas passes directly into the contact acid plant where it is converted into sulfuric acid.

The four Cottrells have 100 pipes each, and are designed for a capacity of 33,900 cfm at 110°F. with a negative pressure of 30" w.g. and a recovery efficiency of 99.0 %!

These Cottrells are the first acid mist precipitators to incorporate a new advancement developed by Western Precipitation engineers... top support of the high voltage electrode system coupled with wind-swept insulator compartments. This new design eliminates difficulties associated with conventional oil-sealed insulator compartments and is a major advancement in this type of Cottrell design.

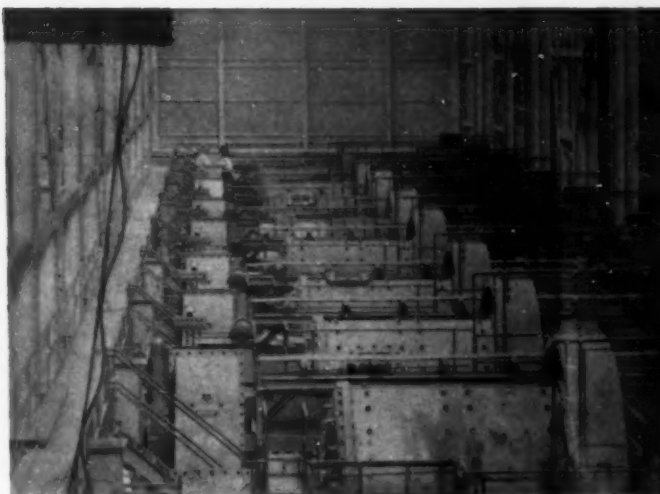
WESTERN

Precipitation

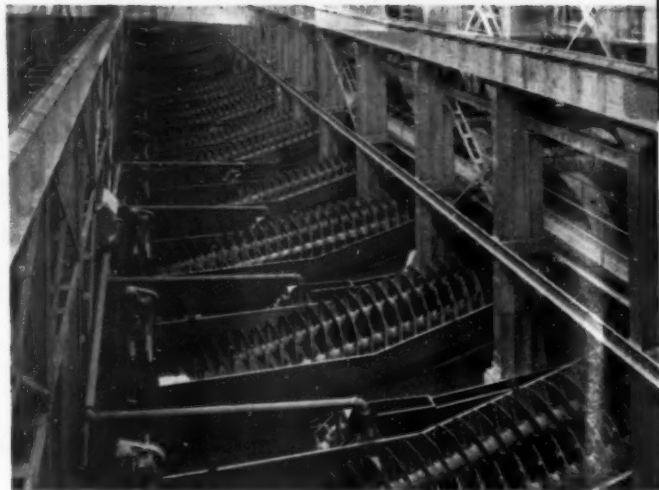
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DESIGNERS AND MANUFACTURERS OF EQUIPMENT FOR
COLLECTION OF SUSPENDED MATERIALS FROM GASES & LIQUIDS

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PRECIPITATION CO. OF CANADA, LTD., DOMINION SQ. BLDG., MONTREAL



copper company
again selects this
cost-cutting team
of
MARCY Mills
and **Akins**
Classifiers



HAS USED TOTAL OF 114 MARCY'S AND 116 AKINS

This leading copper company bought its first Marcy Mill in 1918 and its first Akins Classifier in 1925. Based upon the successful performance of this equipment they have continued ordering Marcy's and Akins for their many plants... have used a total of 114 Marcy Mills and 116 Akins Classifiers. The new mill shown above includes 8, 10' x 10' Marcy Ball Mills and 20, 54" Duplex Akins Classifiers.

Sales Agents:

W. R. Judson, Santiago, Chile

The Edward J. Nell Co., Manila, P. I.

The Ore & Chemical Corporation, 80 Broad Street,
New York City 4, New York

Representatives for Continental Europe

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Mine & Smelter
Supply Co.

DENVER 17, COLORADO

OFFICES IN SALT LAKE CITY, EL PASO, 1775 BROADWAY, N. Y. C.

REPRESENTATIVES IN FOREIGN COUNTRIES



Operator ties MS Connector into "Primacord" trunk line. These dependable Connectors enable crews to tailor the delay-firing pattern to any set of conditions.

For safer open-pit blasting . . . KEEP CAPS OFF THE JOB UNTIL FIRING TIME BY USING DU PONT MS CONNECTORS!

Taconite blasting operations in Minnesota move along with greater safety, thanks to Du Pont MS Connectors. Caps come on the job when, *and only when*, the blast is ready to fire . . . a safety feature crews appreciate. Flexible, too. Whether they're shooting single or multiple rows, these crews can get any practical delay pattern simply by (1) cutting the "Primacord" lines at the proper spots, and (2) tying or taping MS Connectors in place. The number of delay periods is literally unlimited. As a result, vibration's reduced to the very minimum.

Last but not least, MS Connectors provide the improved breakage and reduced backbreak typical of all short-interval firing. Mines using them report "best breakage ever," even in tough taconite.

So see if MS Connectors can improve breakage and increase safety in your mine by trying them soon. For complete information contact the Du Pont man in your district or write: E. I. du Pont de Nemours & Co. (Inc.), Explosives Dept., Wilmington 98, Del.

DU PONT BLASTING AGENTS

Products of Du Pont Research



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BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY



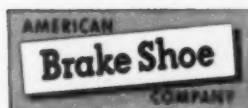
SPECIFY FIRST . . . REPLACE LAST AMSCO DIPPERS FOR MINES

Mine superintendents with years of on-the-job experience, regularly specify manganese steel dippers on new equipment. Most specify by name—Amsco.

The reason is obvious. Amsco manganese steel dippers will stand up longer under

rugged mine treatment and down time will be cut to a minimum.

Next time you order a power shovel or replacement dipper, specify long life right on your purchase order . . . *specify an Amsco manganese steel dipper.*



AMERICAN MANGANESE STEEL DIVISION
Chicago Heights, Ill.

COST-CUTTING MEMOS:



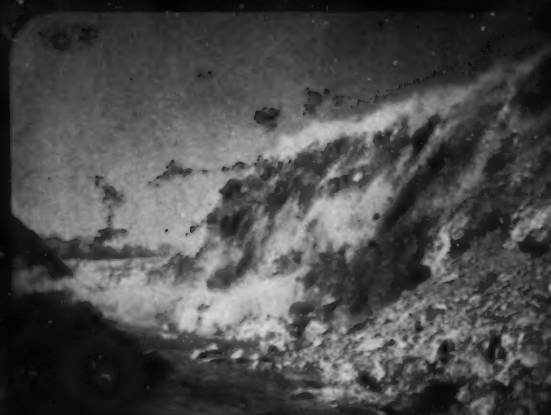
SPOT THE DRILL HOLES RIGHT: Drilling, drill patterns, and spacing are vital factors in reducing explosives costs. In hand-steel days, each hard-won hole was carefully planned to gain maximum breakage and to pull the entire length. Today, careful supervision should be employed to avoid boot-legs and poor fragmentation which result from hasty, unplanned drilling.



USE THE RIGHT SIZE CARTRIDGE: It's costly to tie up manpower arguing with stock cartridges. Be sure you are getting the proper diameter for easy loading. In small diameter holes, take bit wear into consideration in ordering your explosives, reducing diameter of cartridge accordingly. Redi-Slit® cartridges can give both compaction and trouble-free loading.



USE ENOUGH STEMMING: Large diameter holes take a lot of explosives—too much for you to write off the waste of energy which results from "blow-out" shots due to insufficient stemming. Initiation with electric blasting caps at the point of maximum confinement also helps to put the explosives gases to full and profitable use in both large and small diameter holes.



COMPARE MILLISECOND DELAY RESULTS: Organized tests can show what may be achieved with millisecond delay shooting and which pattern gives best results. Check benefits, not only in stoping, but also in drifts, raises, and sinking shafts. Open pit operations should compare progressive and alternate patterns. Sequence photos can show rock movement.

BETTER BLASTING is a combination of the right explosives plus the right methods. The economy and flexibility of fixed explosives in blasting operations have been firmly established. Here are a few of the many ways you can cut costs even further in both open pit and underground work . . . and aid the productivity of your loading crews. If your blasting methods haven't been checked lately, why not call your nearby Atlas representative? His suggestions may help you cut costs—and increase production, too. And write us if you'd like to receive the free, informative periodical "Better Blasting," published quarterly by Atlas to bring you technical tips and product announcements.



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ANNOUNCING THE NEW BUCYRUS-ERIE

A
Rotary Drill
for
6³/₄ to 9-inch
Holes

40-R

Here's big news for quarry and mine operators — Bucyrus-Erie has added another model to its line of rotary blast hole drills. It's the 40-R — designed for drilling 6³/₄ to 9-inch holes.

Like the bigger 50-R, this new drill features the flexibility of Ward Leonard variable-voltage control — an outstanding electrical control that gives the operator smooth instant command over rotation speed of drill pipe at all times. In addition, you have your choice of either electric or diesel-electric power *plus* these other outstanding field-proved advantages.

- ① Hydraulically powered down pressure on the bit for maximum controlled penetration.
- ② You can drill continuously for 27³/₄ feet before an additional drill pipe section is added.
- ③ Motor-controlled drill pipe rack holds four sections of pipe, any one of which can be moved into position over the hole and screwed tight mechanically without operator leaving control station.
- ④ Compressed air is used as a bit coolant and as a cutting remover. Fine cuttings are picked up and handled by a Roto-Clone precipitator; heavies pile up adjacent to the drill hole for use as stemming material.

Complete information is yours for the asking. Just fill in the coupon and mail it today.

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BUCYRUS-ERIE COMPANY
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Gentlemen: I'd like more information on your new 40-R.

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THIS KIND OF SHOVEL SERVICE



Asbestos mine moves 4000 tons daily on 8 trucks

The Johnson's Company, Ltd., with headquarters at Thetford Mines, Quebec, has been mining and processing asbestos ore in this region for close to 70 years.

Its newest mill and open-pit mine at nearby Black Lake represents an \$8,000,000 development and the last word in modern equipment. Typical of its efficient methods is the daily movement of 4000 tons of asbestos ore on 8 big Mack dump

trucks over a $\frac{3}{4}$ -mile haul from the mine to the primary crusher.

To keep its ore moving on uninterrupted schedule, The Johnson's Company decided their best investment was Mack. They accordingly purchased the 8 Model LV, diesel-powered Mack trucks of 22½ tons capacity. Actual performance of these trucks, each carrying 500 tons daily, has more than confirmed the wisdom of the company's choice.

MACK TRUCKS Empire State Building, New York 1, N. Y.

THIS KIND OF SHOVEL SERVICE MAKES MONEY!

A year ago we told you about Northwests at Granby Consolidated Mining, Smelting and Power Company, Ltd. of Copper Mountain, B. C., Canada. That machine has now been in service a year. In that time it has handled nearly half a million tons of material including 241,370 tons of ore. The Northwest worked 8 hours a day, 316 days, with only 3 hours down time in the whole period. You figure it out—or shall we tell you—that's an average of 1,539 tons a day and that's output!

This is typical of Northwest equipment. It tells the story of why so many Northwests both large and small, are in the quarries, the mines, the pits or on the pioneering part of jobs everywhere. They are *real* Rock Shovels and when you have a real Rock Shovel you never have to worry about output in any kind of digging.

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now—the logs are lighter with **MUSCLES OF STEEL**

Gone are the days when muscles of man and beast were the only means of loading and hauling big timber out of the woods. Supplying present-day lumber needs is a job that would lick ten thousand Samsons.

It's a job that demands *muscles of steel*—rugged wire rope that lifts and pulls the heaviest logs with strength to spare.

We of Wickwire play a big part in furnishing these *muscles of steel* to American industry. Wherever wire rope is used—timbering, drilling, construction, mining, fishing, materials handling—there also you'll find Wickwire Rope helping to do a better, more efficient job. That's the reason for the quality and extra care that go into its making.

every industry benefits from wire rope

WICKWIRE ROPE

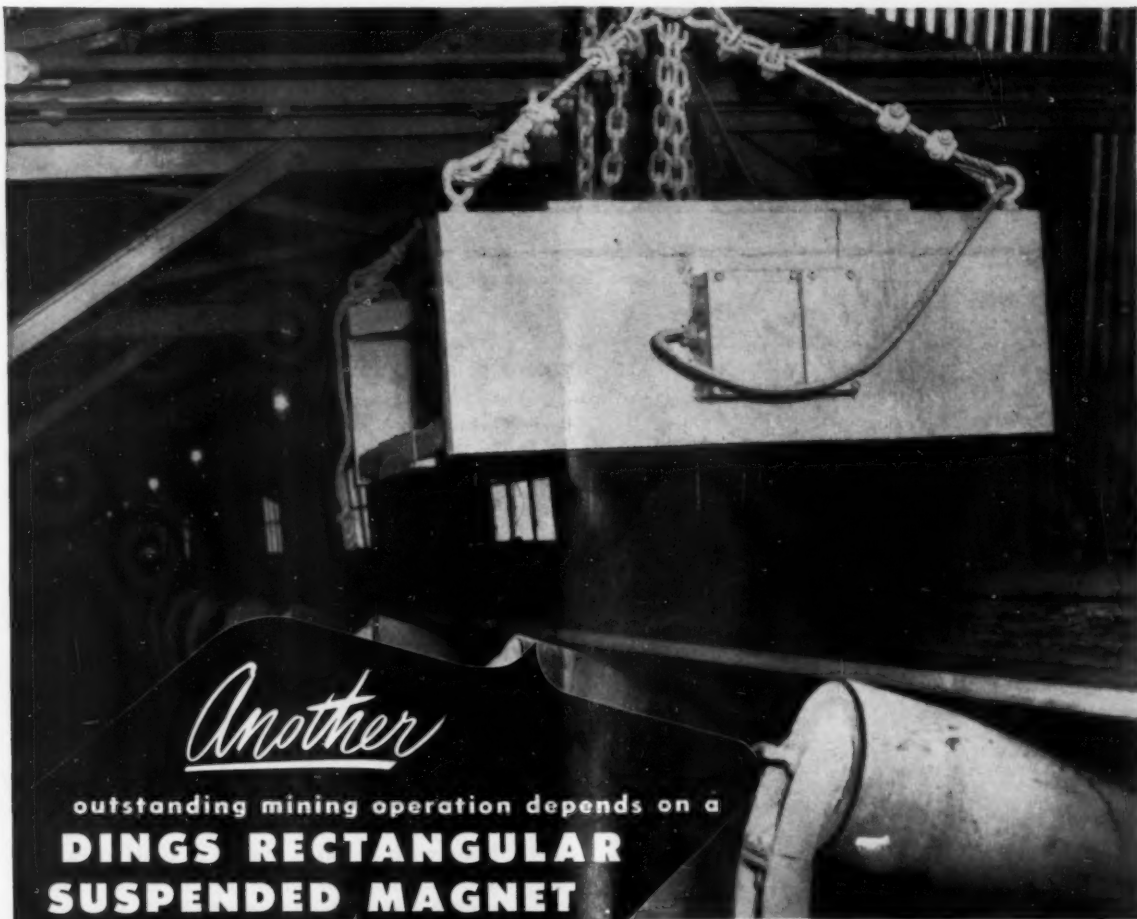


PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL AND IRON CORPORATION



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Another

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**DINGS RECTANGULAR
SUSPENDED MAGNET**
for Positive Tramp Iron Protection

... AT ANACONDA'S WEED HEIGHTS, NEVADA PROJECT

● In large scale mining operations such as Anaconda Copper Mining Company's project at Weed Heights, Nevada, you'll find positive tramp iron protection being provided by big, powerful Dings Rectangular Suspended Magnets . . . installed above belts or chutes.

These Dings RM Magnets are the most efficient tramp iron magnets manufactured. They will stop tramp iron on jobs where magnetic pulleys, old style rectangular magnets or circular magnets fail.

Here, then, is real protection for your crushers, screens and other equipment. Find out about Dings RM Suspended Magnets now. *Send for Catalog.*

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The GISMO offers you an entirely NEW concept of simplicity and economy in mining...

THE GISMO offers you a new method of mining. One that over a period of 2½ years of intensive development in actual work has proved beyond question advantages that merit its thorough investigation by any firm excavating rock or its equivalent.

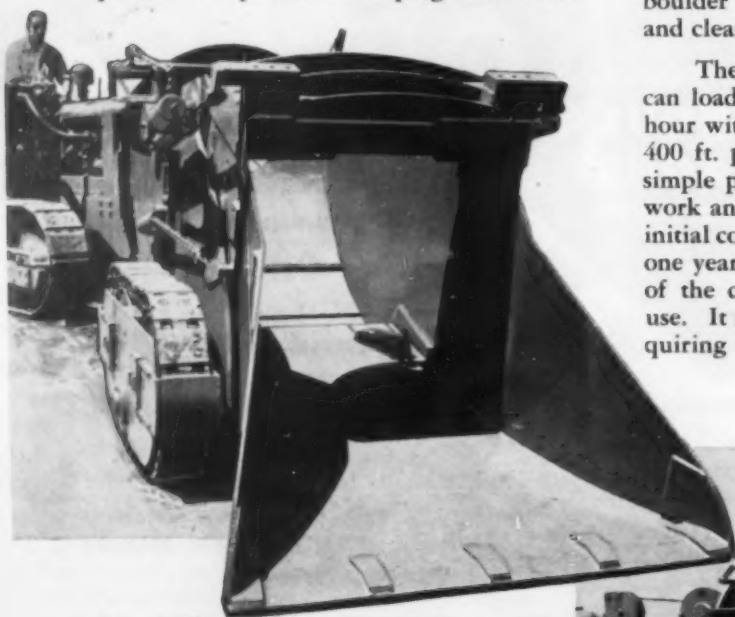
The Gismo offers you a general purpose utility self-loading transport that is simple, versatile and built to take the brutal punishment of rock excavation—and at important savings! It is well suited to almost all mining conditions. No special development facilities or conditions are usually required. It operates in sloping ore bodies

with irregular outlines, as well as large or relatively small openings. The Gismo is easily maneuverable at maximum or minimum speed of the equipment.

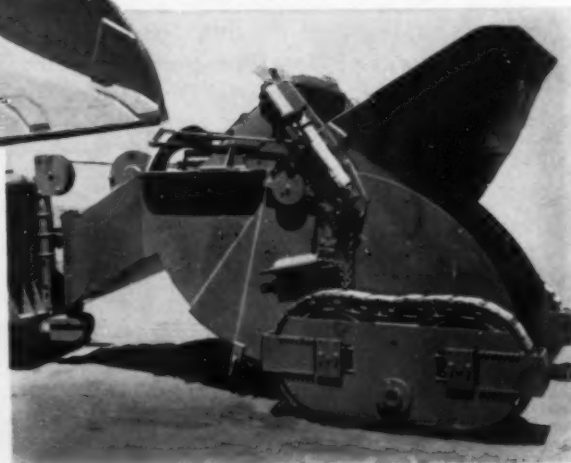
With perhaps a few exceptions, the Gismo can be taken into any mine. Its cross sectional dimensions are small compared with other equipment. It can be dis-assembled for lowering through small shafts.

Its versatility meets every requirement. It loads (mucks) in development or production . . . transports . . . drills (supports 2 to 5 jib mounted drills) . . . back fills . . . moves boulder rocks . . . makes its own roadways and cleans up completely.

The Gismo is an efficient machine that can load and transport up to 100 tons per hour with a 300 ft. haul . . . drill at rate of 400 ft. per man shift . . . is an extremely simple piece of equipment built for rough work and requiring little maintenance. Its initial cost can be reasonably compared with one year's maintenance cost alone of much of the conventional equipment in present use. It makes possible a mining method requiring few machines, few men, less plan-



These two photos show extreme positions the S-D Gismo shovel mechanism takes while loading. Upper photo shows shovel ready to begin loading stroke and photo at right shows position of shovel at end of stroke, loading material back into body.





ning and integration. It allows total mechanization of your mine—the solution to present economic conditions of high man-hour and materials cost, and low metal prices. Contact us for complete information. *Sanford-Day Iron Works, Inc., P. O. Box 1511 . . . Telephone 3-4191, Knoxville, Tennessee.*

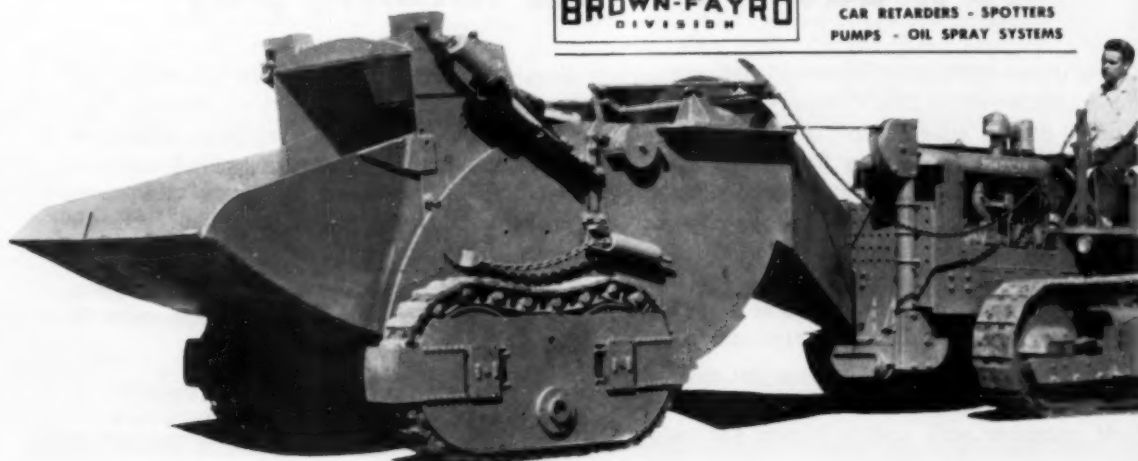
The Glismo does not load by momentum or crash fashion! As it approaches the foot of muck pile, shovel head is eased into pile as simply as a hand shovel into sand. Material is actually shovelled under complete control of operator and within his complete vision. Photo at bottom of page shows Glismo with tractor, operated by only one man.

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GM DIESEL
CASE HISTORY NO. 5310-1X



OWNER: American Zinc Company, North Friends Station Mine, Mascot, Tenn.

INSTALLATION: GM 4-71 Diesels powering 3 Koehring Dumptors. Units haul 8½ tons of rock and ore on 1100-foot run up 11½% grade to surface.



PERFORMANCE: GM Diesel-powered units help 20-man crew produce 500 tons of ore per day. Use of rubber-tired equipment cut cost of access shaft construction by 70%.

It Pays to STANDARDIZE on



GM DIESELS GO UNDERGROUND *to make trackless mining pay*

One of the world's most efficient small underground mines, the American Zinc Company's new North Friends Station mine is proving the economy of trackless operation. With a fleet of three GM Diesel-powered Koehring Dumptors handling the haulage, the mine is producing 500 tons of ore per day—about 25 tons of ore per man-shift. Mine Foreman Bill Armstrong says: "These units run along month after month with almost no repairs. Our costs are much less than we expected."

General Motors 2-cycle Diesels are just as much at home underground as on the surface. Two-cycle operation with uniflow blower scavenging

gives more complete combustion of low-cost fuel for higher efficiency and cleaner exhaust. Used with exhaust scrubbers and adequate ventilation, mine air stays well within permissible limits. And two-cycle operation means faster acceleration, quicker response to controls, faster haul cycles for increased production.

There's a GM Diesel for every kind of mining job. Specify GM Diesel power in *your* equipment. It will save you money.

DETROIT DIESEL ENGINE DIVISION

GENERAL MOTORS • DETROIT 28, MICHIGAN
Single Units... 80 to 300 H.P. Multiple Units... Up to 800 H.P.

Drifts and Crosscuts

Mercury and Atomic Energy

In this column in the October 1954 issue of MINING WORLD the question was asked "Who's Got the Mercury?" At that time it appeared that the Atomic Energy Commission, despite official denials, was a user of mercury. It was pointed out that "Not as a consumable material in a nuclear reaction but rather as a coolant or heat exchanger for power plants."

Declassified information now indicates that the AEC used mercury as a coolant in its "Clementine" reactor at Los Alamos, New Mexico starting in 1949. This was a "fast neutron" research reactor. In March 1950 operational problems were encountered during full operation. A uranium spacer rod had ruptured and the mercury coolant which circulates around the metal-clad uranium rod was contaminated with both uranium and plutonium. The reactor was repaired and continued in operation. Subsequently a plutonium fuel rod was ruptured and again contaminated the mercury—this time presenting a serious hazard from plutonium poisoning. The reactor was shut down and radioactive parts were transferred to disposal areas.

Significant is the fact that mercury was the coolant even though the total quantity was small, for the reactor was only 11 by 15 by 9 feet high. Also that contamination apparently resulted only from failure of reactor components.

Gold and 84th Congress

Uranium has been so much in the news and everybody's minds that very few mining companies and fewer prospectors are thinking about gold today. Nevertheless, many economists and monetary experts know that gold must again regain its rightful position. Actually, the uses for gold are continually expanding.

It is most encouraging to note that the Congress of the United States will not have an opportunity to forget gold. Congressman Clair Engle, long-time California Congressman and champion of the domestic mining industry, is now Chairman of the House Committee on Interior and Insular Affairs which has a permanent mining sub-committee. Here is what Congressman Engle plans to do for gold in the present Congress.

"I intend again to introduce the bill that the late Senator McCarran and I had for several years to permit a free market for domestic newly mined gold.

"The basic fact that supports this legislation is that the commercial, industrial, and professional uses of gold for more than 10 years have exceeded the domestic production of gold, and, as a consequence, these commercial uses have been an actual drain on the gold reserve of the country. That should no longer be permitted. The gold producer should have freedom to satisfy the commercial demands at a price established in the free market. I intend to urge this legislation again, but I am not hopeful in view of the attitude of the Treasury Department, which is very much the same now as it has been ever since I came to Congress."

Not A Tungsten Have Not

Mine production figures for tungsten output just released by U. S. Bureau of Mines show that in the third quarter of 1954 domestic mines produced a record 3,767 short tons of 60 percent WO_3 concentrate. Also, that the record annual production of 11,473,000 pounds of tungsten set in 1943 would probably be exceeded in 1954 with output approaching 13,000,000 pounds.

This production is largely the result of the Domestic Tungsten Program and proves that when the tungsten mining industry has an opportunity to make a profit it can mine the tungsten.

What has happened to those planners who said the United States was running out of tungsten ore?

Metal Markets

Rhenium, with the second highest melting point of all metals (about 3,180° C.), should find important uses for electrical contacts and in electron tubes despite scarcity and high price. Other potential uses may be for high temperature thermocouples and high-wear-resistant parts. World production amounts to only a few hundred pounds per year now so the metal will be expensive even at a much greater rate of output which could be increased to a few tens of thousands of pounds per year.

There are no ores of rhenium and all production to date has been a byproduct from roasting of molybdenum and copper molybdenum concentrates.



"We get the best performance from **CAT*** Engines"

That's what Fred McLane, vice president of S. E. Evans Construction Co. of Ft. Smith, Ark., says. He adds, "We plan to buy principally Cat equipment in the future." The company has three construction units, for the most part Caterpillar-equipped. Working in the iron ore fields near Linden, Texas, this excavator loads 70,000 tons of crude ore producing 20,000 short tons per month of concentrates ranging from 46 to 47% iron. The crude ore is taken from a virtually unlimited supply.

The performance of the Caterpillar D386 Engine in this Manitowoc model 4500 dragline is one reason for the company's satisfaction with Caterpillar equipment. The husky 400-HP diesel replaced two engines of another make. "We now have plenty of power," says operator J. T. Hall. And it's steady, reliable power. The big rig, with 83-foot boom, loads 250 wagons a day, filling each one with three passes of its bucket.

In its first 1900 hours of operation, the rugged Caterpillar D386 has needed no repairs. S. E. Evans Construction Co. expects many more thousands of hours of dependable, economical work life, thanks to such Caterpillar features as specially hardened crankshaft journals, long-lived aluminum

alloy bearings, and efficient filters and seals. Important in cutting costs is the ability of every Cat Diesel to deliver full and *foul-free* power on inexpensive No. 2 furnace oil.

There are 12 sizes of Caterpillar Engines and Electric Sets, to 500 HP and 315 KW. Leading manufacturers can supply Caterpillar power in their excavators and other mining machinery. And you can get replacement power from your Caterpillar Dealer—who will help you cut costly down time to a minimum with fast, skilled service and genuine, high-quality parts. Ask him today to help you select the rugged yellow engine that will do the most work for you at the lowest cost.

Caterpillar Tractor Co., San Leandro, Cal.; Peoria, Ill., U.S.A.

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**SPECIFY CAT POWER
FOR HIGH-PROFIT
PERFORMANCE**



Capitol Concentrates

Miners Should Take Initiative On Legislation Covering Mining Claims

It appears as though there will be a big drive during the 84th Congress to pass some legislation similar to the infamous Hope bill of the 83rd Congress. That bill, it will be remembered, was stopped only because of a conflict of jurisdiction between the House Interior and Insular Affairs Committee and the Committee on Agriculture. The Interior Committee had reported favorably the D'Ewart bill which, in general, was approved by the mining industry.

The Hope bill, on the other hand, would have permitted multiple use of mining claims on the National Forests, set impossible regulations for handling the timber on the claims, and would have put placer miners at the mercy of the agencies. If the proponents of the Hope bill cannot revive it, they intend to put the same features in an omnibus bill to codify the laws pertaining to conservation and reclamation.

The mining industry should take the initiative and introduce a bill such as the last Anderson bill (which contained the main features of the D'Ewart-Regan bills) and pass it before the phoney conservationists and bureaucrats get the jump on the situation.

• Justice Was Not Deciding Factor

Let no one think that the action of the Office of Defense Mobilization in revising the GSA regulation governing the purchase of manganese at the Wenden, Arizona, buying station was taken because the agency saw the equity and justice of so doing. Only the pressures generated by the potential closing of 50 mines and throwing out of work about 1,000 miners who had been absorbed largely from the moribund lead-zinc industry of the state caused the last-minute change of heart—after the closing announcement already had been published.

And, speaking of lead-zinc, the Bureau of Mines has reported that the domestic mine output of these metals in 1954 probably will be at the lowest level since the depression year 1934. So much for the vaunted mineral policy of March 26, 1954, and the stockpile purchase policy based thereon "to aid distressed areas." The most that can be said is that by supporting present levels ODM may have prevented things from getting worse.

• Tariff Reductions And Trade, Not Aid

President Eisenhower's program to further reduce tariffs to stimulate the "trade, not aid" program probably will meet some snags in the House Ways and Means Committee. These snags, by the way, will be provided by Republican and not Democratic members. While the Administration, on the one hand, is pressing for authority to make further tariff conces-

sions, it is expected to ask the Congress for huge amounts of money for various Foreign Operation Administration programs, many of which obviously are not really appreciated by the recipients of the aid. There must be something about these conflicting patterns which makes sense.

• North Carolina Heads The List

The November 1954 report of the Defense Minerals Exploration Administration holds some surprises for those who think that mining is exclusively a western industry. North Carolina has been awarded 137 exploration contracts, the next nearest figure being 90 for Colorado. This admirable agency had executed \$33,310,099 worth of contracts through November 1954, of which \$20,264,569 were in force.

• Mercury Mines Seek Eligibility Certificates

It is somewhat amusing to note that the General Services Administration, no doubt at the instance of the Office of Defense Mobilization, is taking credit for the expansion of the domestic mercury production. The expansion is due, of course, to the present world shortages and the current market price of around \$320 per flask, not to the GSA offers to buy at \$225 per flask. The reason for the elation is that some 17 producers have applied for certificates of eligibility. As this is purely a nominal matter which can be done on a postcard, any producer would be silly not to apply. Should, by chance, the bottom drop out of the market again (although at this point it does not seem likely in the foreseeable future) a producer had better be in a position to liquidate his stocks and production at \$225, while he is closing down, than at some lesser figure.

• Interior Department Organizes Metal Unit

A metals and minerals preparedness planning staff is being organized within the Department of Interior. The group, which will function through the office of Felix E. Wormser, assistant secretary for mineral resources, will be responsible for evaluating periodically the supply and demand situation for the various metals and minerals in order to recommend methods of achieving a proper level of domestic production as part of the nation's mobilization base.

Establishment of the new group follows delegation of authority for this responsibility from the Office of Defense Mobilization to the Interior Department in line with recommendations by the President's Cabinet Committee on Minerals Policy.

The new unit will draw on the Bureau of Mines and the Geological Survey for technical aid, and will represent the Interior Department in discussions with

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Lead and Lead-Zinc Smelter }
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International Smelting and Refining Co.

818 Kearns Building
Salt Lake City, Utah

Please establish contact prior to shipment.

ODM, the Commerce Department and other interested agencies on problems concerned with building and maintaining the metal and minerals mobilization base.

No change is contemplated in the role of the Defense Minerals Exploration Administration, or of the General Service Administration which will continue to handle procurement.

• Stockpile Report Draws Criticism

The Office of Defense Mobilization in its latest stockpile report has again issued a lot of words which it is doubtful will ever be properly implemented. (At least there are no signs of actual good faith to the present time.) ODM repeats the general language of the March 26, 1954, White House policy statement that "acquisitions for the long-term stockpile will be made ordinarily at such times as the government decides that purchases will help to reactivate productive capacity and in other ways alleviate distressed conditions in the domestic mining industry where the nation's mobilization base is concerned." These are noble sounding words indeed, and they are well calculated to fool the non-mining public.

The new mercury and manganese programs are about as meaningless as they can be made. The lead-zinc purchase program has helped to prevent the larger mines from shutting down, but has not helped appreciably to alleviate distressed conditions which were allowed to get out of hand before purchasing began. Furthermore, it is a "sufferance" program with no fixed element of time or quantity, and was designed primarily to take the heat off the White House on the question of increased tariffs. It could be cut out tomorrow. Other domestic purchase programs were continued by Congress in the Malone-Aspinall bill, which was opposed by ODM and GSA.

The only hope for a real mineral program which can be relied upon evidently lies in Congress. The industry cannot depend upon bureaucratic whims and remain healthy. If the "domestic mobilization base" is to be "expanded" in a logical way, and in such fashion that producers can depend upon the program, legislative action is the answer. The Office of Defense Mobilization and its director, Professor Arthur Flemming, have come in for an immense amount of bitter criticism. In the metals and minerals field, at least, it appears to be merited.

COMING CONVENTIONS

February 3 through 5, 1955. The 55th Annual Convention COLORADO MINING ASSOCIATION and affiliated groups. Shirley Savoy Hotel, Denver, Colorado.

February 7, 8, and 9, 1955. McINTYRE-SARANAC CONFERENCE, Saranac Lake, New York.

February 14 through 17, 1955. Annual meeting AMERICAN INSTITUTE OF MINING ENGINEERS, Conrad Hilton Hotel, Chicago, Illinois.

March 6 through 9, 1955. Annual meeting and convention CANADIAN PROSPECTORS AND DEVELOPERS ASSOCIATION, Royal York Hotel, Toronto, Canada.

March 7 through 11, 1955. Joint meeting AMERICAN SOCIETY OF PHOTOGRAMMETRY and AMERICAN CONGRESS ON SURVEYING AND MAPPING, Washington, D. C.

March 28 through April 1, 1955. Ninth WESTERN METAL CONGRESS and EXPOSITION, Pan Pacific Auditorium, Los Angeles, California.

April 19 through 21, 1955. Annual meeting CANADIAN INSTITUTE OF MINING AND METALLURGY, Royal York Hotel, Toronto, Ontario, Canada.



Thermoid Hose designed specifically for use in mines

Thermoid designs and manufactures many types of hose built to give longer service and lower operating costs in a wide variety of specific applications. These 3 are ideal for rugged mining work:

THERMINE Heavy duty air hose, mandrel-built with oil resistant tube reinforced by high tensile yarn. Smooth, abrasion-resistant cover.

THERMOFLEX Mandrel-built air hose for extreme service and direct connection to compressors. Smooth, black, abrasion-resistant cover.

#325 SUCTION HOSE For heavy duty water suction service. Smooth bore, wrapped hose with heavy wire reinforcement, durable cotton duck plies.

Thermoid research is responsible for new, better construction that makes Thermoid hose more durable . . . easier to handle. In addition to hose, your Thermoid Distributor also carries a complete line of Thermoid Conveyor Belting and Multi-V Belts. Call him for complete information. Or if you prefer write direct.

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Conveyor & Elevator Belting • Transmission Belting • F.H.P. & Multiple V-Belts
 Wrapped & Molded Hose • Rubber Sheet Packings • Molded Products
 Industrial Brake Linings and Friction Materials

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ONE NO. 80 SCRAPER DOES IT ALL!



The Caterpillar No. 80 Scraper in the picture removed nearly all the clay overburden from this 100-foot-deep pit. It was then used to move iron ore to the washing plant of Hodge Mining Company at this operation 7 miles north of Canton, Ga. Cycle time was $8\frac{1}{2}$ to 9 minutes over a haul distance of 2000 feet, involving extremely stiff grades out of the pit.

Maneuverability in these cramped quarters is a "must." With its ball-and-socket front axle, and sharp turning ability, the No. 80 Scraper is just the rig for this job, according to John W. Hodge, owner.

Even in mucky clay, the No. 80 loads fast, with a live, "boiling" action. The load is cradled low for stability in rough going, and big tires give excellent flotation. Absence of overhead structure permits good operator vision, and presents an easy "target" for shovel loading. The No. 80's capacity is 20 heaped yards (23 with top extensions). It unloads fast and even, thanks to the positive ejection system that controls the rate of spread and sweeps the bowl clean of even sticky materials.

The versatile No. 80 Scraper, teamed with the Caterpillar D8 Tractor, may be the rig to cut costs in your mining

operation. Or one of the other CAT* Scrapers for track-type and rubber-tire tractors with capacities from 4.5 to 25.5 yards. Your Caterpillar Dealer will help you select the scraper that's most profitable for you. And he'll stand back of his products with prompt, dependable service and genuine Caterpillar replacement parts. Ask him for a demonstration right on your own job today.

Caterpillar Tractor Co., San Leandro, Cal.;
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Mining World

THE IMPORTANT MINING MAGAZINE EVERYWHERE

February, 1955

INTERNATIONAL PANORAMA

LIMA, PERU—Southern Peru Copper Corporation, formed by American Smelting and Refining Company, Phelps Dodge Corporation, Cerro de Pasco Corporation, and Newmont Mining Corporation, will build all facilities to bring the Toquepalla copper deposit into production at 30,000 ton per day rate.

SALT LAKE CITY, UTAH—Uranium stocks valued in excess of \$20,000,000 were registered by the Utah State Securities Commission in 1954. Out of 164 approved registered companies 31 were reported as shipping ore.

ROME, ITALY—World demand for mercury has caused the Italian Ministry of Industry to request Monte Amiata Company, largest Italian mercury producer, to submit plans to increase output by reopening mines on idle concessions.

SEVEN ISLANDS, QUEBEC—Iron Ore Company of Canada in 1954 mined and shipped more than 2,000,000 tons of ore. First shipment was made on July 31, 1954. This year's shipments are set for 6,000,000 tons.

WARSAW, POLAND—The Polish government has started copper production at the new Boleslawiec mine. This is the first new post-war copper mine in Poland and the second in the country.

EAST ST. LOUIS, MISSOURI—Shipments of zinc from domestic zinc smelters in November 1954 were 97,598 tons, the largest for any month in seven years. Government purchases were 15,566 tons.

MARIETTA, OHIO—The Electro Metallurgical Company has started production of 99.9 percent electrolytic manganese from its new plant here. Output is scheduled at 6,000 annual tons.

BAGUIO, PHILIPPINE ISLANDS—Lepanto Consolidated Mining Company milled its 2,000,000th ton of ore mined after World War II early in December 1954.

RICHMOND, VIRGINIA—The State of Virginia has granted the first lease for mineral drilling in coastal waters of Chesapeake Bay. Under lease terms, S. S. Alderman, Jr., will drill test holes for titanium and zirconium.

SUDBURY, ONTARIO—Free World nickel production in 1954 was 390,000,000 pounds—a record high. Canadian production was up to 320,000,000 pounds from 286,000,000 in 1953.

MOUNT ISA, AUSTRALIA—Mount Isa Mines Ltd. is investigating the possibilities of building a retort zinc smelter at Bowen, Queensland. Coal is available from subsidiary mines. The smelter would be able to treat 50,000 tons of Mount Isa's zinc concentrate annually.

RANGOON, BURMA—The Burma Government Mineral Resources Development Corporation has developed extensive reserves of manganese ore in the Southern Shan States. A shaft has been sunk to a depth of 250 feet east of Taunggyi in Hopong State.

MARQUETTE, MICHIGAN—Cleveland-Cliffs Iron Company has awarded a construction contract to the McDowell Company for erection of a 2,000 ton per day agglomeration plant here for Jasper concentrates from Cliffs' Republic mine.

GILMAN, COLORADO—The New Jersey Zinc Company and the Texas Company have joined forces to explore for uranium deposits in the western part of the United States.

SAN FRANCISCO, CALIFORNIA—An all-time record high tungsten output was made by United States mines during the third quarter of 1954 when 3,767 short tons of 60 percent WO₃ were produced.

VANCOUVER, BRITISH COLUMBIA—Granby Consolidated Mining, Smelting & Power Co., Ltd. has made arrangements for sale of copper through July 1955. Buyer for refined metal through April is the United States GSA.

DARWIN, CALIFORNIA—Anaconda Copper Mining Company has reopened its Darwin lead-zinc mine and mill here following an 11 months shut down.

BELGRADE, YUGOSLAVIA—Plans are underway to rebuild the Bor copper smelter. Reverberatory furnacing will be used. Byproduct gases may be used for sulphuric acid manufacture.

CCI TO Build Pelletizing Plant at Republic Mine

Contract to construct an agglomerating plant for its Republic mine has been awarded by The Cleveland-Cliffs Iron Company to the McDowell Company of Cleveland. This 2,000-ton-per-day plant will pelletize by the so-called updraft traveling grate process high-grade iron ore concentrate produced from the Jasper formation. The plant will be located on the main line of the Lake Superior & Ishpeming Railroad at a site a few miles west of the port of Marquette, Michigan. Construction will start shortly.

The Republic mine, scheduled for production late this year, is CCI's second venture into the development and concentration of Michigan's iron-bearing, low-grade (Jasper) hematite. The first was the Humboldt mine which went into production early last year. Initial production from the Republic mine and plant is estimated at 500,000 tons per year, about twice the rate of the Humboldt.

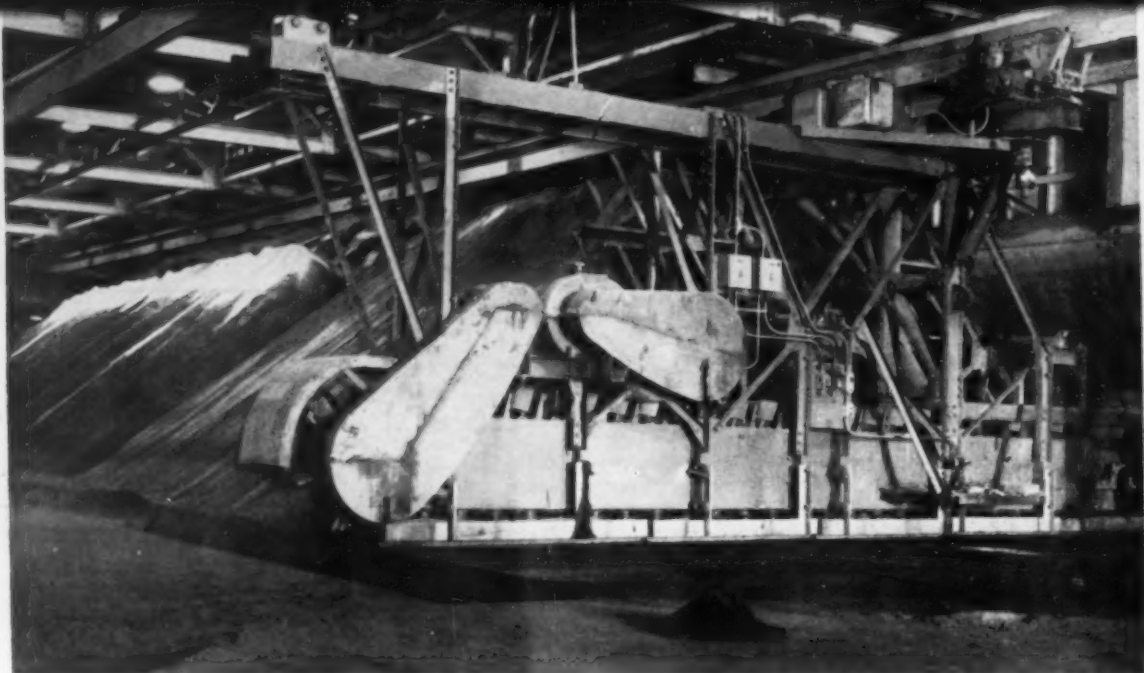
Two unusual features of the new pelletizing plant are termed "firsts" in iron ore beneficiation. One, the "BallWell Flying Saucer," is an agglomerating disc now being fabricated by the Wellman Engineering Division of McDowell. Another is an updraft traveling grate capable of producing 2,000 gross tons of pellets daily.

Republic Builds New Mill Near Mexican Rutile Mines

Republic Steel Corporation plans to ship 2,000 tons of 95 percent titanium dioxide per month from a concentrating plant near its Pluma Hidalgo mine in the state of Oaxaca, Mexico. Republic owns outright the mineral rights to a tract six miles long and 1½ miles wide and has 38 claims on 8,000 acres in what is reported to be the richest titanium deposit in the Western Hemisphere.

Discovered in August 1953, more than 25,000,000 tons of rutile, (TiO₂) have been proved. Plans for a concentrating plant one-half mile from the first mine working have been designed in Republic's Cleveland, Ohio office. Completion of the plant is expected before the rainy season starts in June.

Construction design will enable the plant capacity to be tripled by expansion at each end. Rutile will be ground to 60 or 80 mesh and packed in metal drums for shipment from Puerto Angel through the Panama Canal to the United States. Compressors, crushers, gravity tables, and Humphrey spirals have been ordered and will be trucked 134 miles from the railroad at Oaxaca. Because power requirements are not expected to be large for some time, Diesel power will be used at the plant.



CUSTOM-MADE CHARGE deposited on floor of bedding plant is reclaimed by this unique machine, a product of the joint efforts of Stearns-Roger Manufacturing Company and

Bunker Hill men. The reclaimed charge is pelletized and the small nodules roasted on Dwight-Lloyd machines. Improved charge make-up has made possible maximum smelting capacity.

What's New in Lead Smelting?

Vastly improved charge handling pelletizing flux and lead concentrate one step roasting all at Bunker Hill's plant

Few changes have been made in lead smelting techniques in the past 15 years—so when Bunker Hill & Sullivan Mining & Concentrating Company built a completely new charge preparation plant that improved the efficiency of its operation, the event is worth reporting.

The prime purpose of the charge preparation plant at the custom lead smelter in Kellogg, Idaho, is to prepare a charge that has the proper physical and chemical properties for maximum sintering and smelting capacity. This is largely accomplished by:

- Adequate grinding, and intimately mixing all the concentrates, byproducts, fluxes, etc., in the proper proportions to gain operational uniformity, maximum sintering and smelting efficiency;
- Then pelletizing such blended mixture to obtain porosity for increased sintering capacity.

New Facilities Necessary

The plant is the result of an extensive research and development pro-

gram which indicated the following facilities were necessary:

1. Receiving and storage bins which can be used during all weather conditions.
2. A crushing plant capable of reducing all the material making up a charge to minus- $\frac{1}{4}$ -inch.
3. Bins with a positive discharge for blending the numerous ingredients into a composite.
4. A mixer which can make the composite nearly homogeneous.
5. A bedding plant to further mix the charge and to provide a delay for making final charge adjustments.
6. A pelletizing plant.
7. A means of drying and storing the pellets.

The present plant has these facilities plus all of the necessary sampling and weighing equipment.

Investment: \$2,500,000

The Plant was constructed by Stearns-Roger Manufacturing Company, Denver, Colorado, at a cost of about \$2,500,000. Work was started late in 1951 and completed in Octo-

ber 1953 without interfering with the regular smelter operations.

The Preparation Plant is divided into four separate units; namely, crushing plant, proportioning plant, bedding plant, and pelletizing plant. The crushing, proportioning, and pelletizing plants are all operated independently. A description of the operating practice and the equipment in each plant is given below:

Receiving Bins

The purpose of the crushing plant is to receive all incoming materials and to reduce all the ingredients that are to be used in the charge to less than $\frac{1}{4}$ inch size. This consists of material such as crude ores, limerock, return dump slag, circulating byproducts, etc. It is also used to crush any other material that is to be used in the smelter.

There are 27, 2,600 cubic foot, receiving bins that are serviced overhead by either trucks or railroad cars. Ten of these bins are used to receive lead concentrates; seven are used to

receive other materials, such as circulating fumes, residues, etc., that do not require crushing. Each of these bins has a belt feeder for transferring the material, by a belt conveyor, to the corresponding storage bin in the proportioning plant. The other 10 bins receive the materials that are to be treated in the crushing plant. These include crude ores, limerock, silica flux, return sinter, dump slag, and numerous circulating byproducts. These bins discharge into a movable pan feeder which controls the feed rate to the crushing plant.

Crushing

Nearly all of the material that enters the crushing plant passes through a 24-by 36-inch Traylor Type H jaw crusher and then over a 4- by 8-foot Allis-Chalmers rod deck screen with $\frac{1}{2}$ -inch openings. The oversize, after being crushed in an Allis-Chalmers No. 648 Hydrocone, is combined with the undersize. At this point, all of the material is less than $\frac{1}{2}$ -inch size. It is then elevated by a 77-foot high Jeffrey continuous bucket elevator to a sampler.

Four Circuit Choices

The material passing through the sampler is diverted, by a three-way splitter and a reversible belt, to one of four different routes: (1) It can be conveyed out of the crushing plant and into a railroad car or truck.

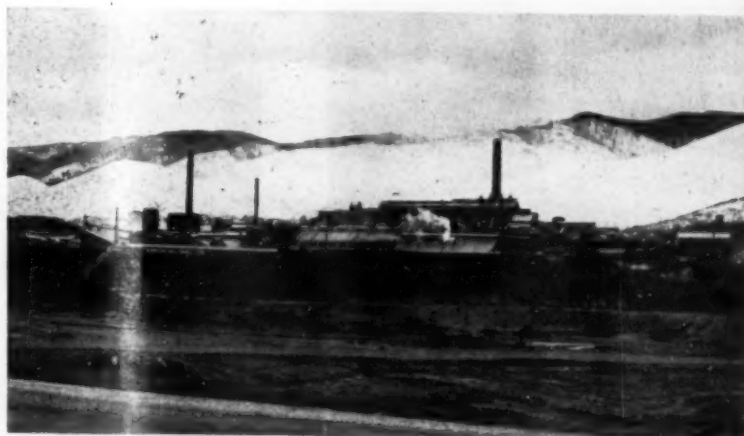
(2) It can be transferred to either of two different bins. Each bin is 12 feet in diameter and 17 $\frac{1}{2}$ feet high. The material from these bins is fed to a 9- by 12-foot Allis-Chalmers peripheral discharge rod mill. This dry mill operates at 16.5 revolutions per minute, and has a 30-ton rod load. The mill discharge passes through a 1-mesh, 36-by 54-inch Robins Gyrex screen to remove broken rods, and then to a 12-by 4-foot Jeffrey double paddle mixer. Water is added to the mixer to prevent dusting in the subsequent operations. The material from the mixer can be conveyed to a railroad car or to the appropriate storage bin in the proportioning plant.

(3) Since the rod mill will not operate successfully when the feed contains more than 2.0 percent moisture, the splitter can also divert material to an oil-fired Stearns-Roger 8-by 60-foot rotary dryer. The discharge from this dryer is transferred directly to the rod mill. It is also possible to convey material directly from two of the receiving bins to the dryer.

(4) The final branch of the splitter is used for return sinter only, which is fed to a 4-by 8-foot Symons rod deck screen with $\frac{1}{2}$ inch openings.



HOW 19 PRODUCTS are gathered to make a furnace charge at the Bunker Hill lead smelter. Pan feeders with variable speed drives draw concentrate, flux and plant by-products from these hoppers and discharge to a gathering conveyor.



BUNKER HILL'S LEAD SMELTER is a familiar sight along the well traveled U. S. Highway 10, just outside of Kellogg, Idaho. The newly installed charge preparation plant has permitted the operator to reach a new high in smelting techniques.



PROCESS CONTROL requires a lot of time from Superintendent of Metallurgy, Don Ingvaldstad shown at left. Glenn Blickensderfer, right, heads the new charge preparation plant. Many staff members came up through the research department.

How a Tailor-Made Sinter is Prepared ...



1. COMPANY DESIGNED PAN FEEDER is spotted under a pair of chutes on a high-line bin. This unit draws from ten bins storing fluxes and reclaimed slag. It loads a conveyor leading to a crusher.



2. DUST HOODED ROD MILL grinds coarse charge components to minus 8-mesh in the newly installed crushing plant at Bunker Hill.

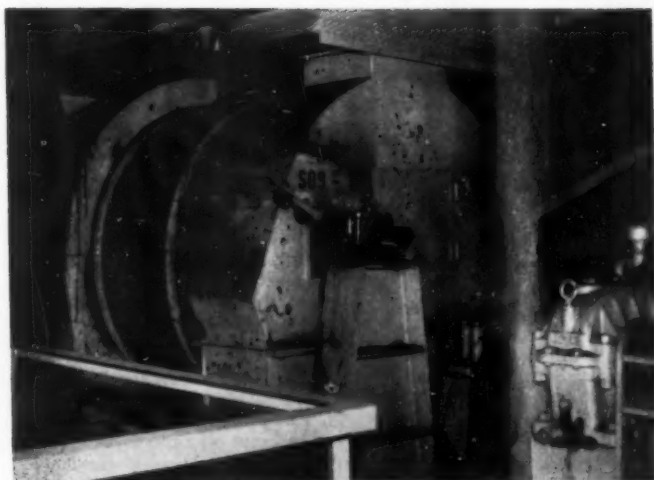


3. BIG STORAGE AREA provides ample room for build-up of charge components. Concrete bins at left of grizzly covered hoppers receive crushed flux; those on right, Pb concentrates and fine products.

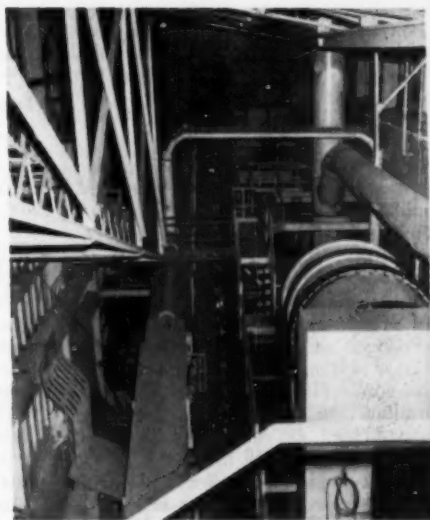
4. FEED IS METERED into the system by 19 hoppers with apron feeders loading a gathering conveyor. Gate opening and apron speed are adjusted to deliver the desired pounds per minute. Picture No. 3 shows hopper tops.



5. METERED FEED is deposited on one of four bedding piles. Small corrective additions are made then they are reclaimed with this machine. The rake at right digs into pile sloughing material to chain mounted flights.



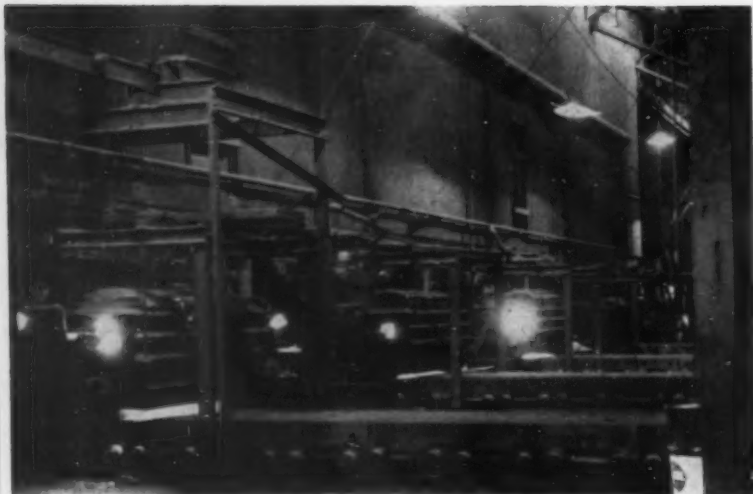
6. MIXING CHARGE before pelletizing is important. This unit contains two spray heads which raise the moisture content to 9 percent. Its feed is the corrected charge reclaimed from the bedding piles.



7. PELLETIZING provides better draft control for the Dwight Lloyd sintering roasters. Nodulizing drum shows at bottom right.

8. POROUS BEDS on the roasters are a primary advantage obtained from installing the new charge preparation plant. Ten machines now oxidize lead concentrates in one step. Most other smelters use 2-stage roasting.





ONE STEP ROASTING of lead concentrates is now possible following construction of the charge preparation plant. In addition, the enriched gas now pulled off the Dwight-Lloyd roasters will support a possible future sulphuric acid installation.

The oversize is conveyed to the roaster building to be used for pallet dressing, and the minus-4-inch fraction is transferred to the proportioning plant to be used for sulphur dilution.

Charge Make-up

The proportioning plant provides storage facilities for all the crushed materials from the crushing plant and for the fine materials from the receiving bins. Its primary purpose is to make up a uniform charge by blending the following ingredients: (1) all of the concentrates, residues, and by-products are blended in the same ratios as the current rate of smelter receipts, (2) return sinter for controlling the fuel (sulphur) in the roaster feed, (3) return dump slag to control the lead fall in the blast furnace feed, and (4) silica and lime-rock to maintain a proper blast furnace slag.

Hoppers Loaded by Crane

The plant contains 19 concrete storage bins in two rows. One row has eight 6,000-cubic-foot bins and the other has six 3,600-cubic-foot and five 7,200-cubic-foot bins. These bins are supplied overhead from two belts (one from the crushing plant and one from the receiving bins) with Hewitt-Robins trippers. Between the two rows of concrete bins is a row of 19 steel, hopper-bottom, proportioning bins. An overhead P & H crane equipped with a 2-yard Blaw-Knox bucket is used to transfer the material from the outside concrete storage bins to the inner 1,000 cubic foot proportioning bins. A proportioning bin is provided

for each of the 19 storage bins. The proportioning bins are covered with a steel rail grizzly to break up the large lumps of material. The grizzly spacings vary from 6 to 18-inches.

Feed Metered to Conveyor

The proportioning bins are each equipped with a 4-by 8-foot apron feeder which discharges onto a 30-inch collecting belt. Six of the feeders are ratchet-driven and 12 have a variable speed continuous drive. The discharge rate is controlled by variable gate openings and the variable drives. The collecting belt, which normally carries 180 to 200 tons per hour, discharges onto a cross conveyor.

This conveyor, after traveling under an electric magnet, feeds the material into an impactor which breaks up the lumps and thoroughly mixes the charge. The impactor is a Pennsylvania, size CF-7-38, reversible unit driven by a 200-horsepower motor. The product from the impactor is conveyed over a Merrick Model E Weightometer and Rateograph while it is being transferred to the bedding plant.

Bedding Plant

The bedding plant is large enough to hold four 925-ton bedding piles. Normally, one bed is being laid down while another is being assayed; final corrections are being added to the third, and the fourth is being reclaimed.

The material from the proportioning plant passes through a sampler and then to one of two different belts.

These belts lead to opposite sides of the building so that two beds can be laid, end to end, on both sides. A moving Hewitt-Robins tripper is used on each belt. The piles are divided longitudinally by a sub-level collecting belt which is fed by a Stearns-Roger, Bunker Hill designed reclaimers. This reclaimer, which operates from overhead rails, consists of an inclined manifold of rakes that cut slices from the face of the pile, and a drag conveyor that moves the fallen material to the collecting belt. The forward motion of the reclaimer is intermittent, but automatically controlled by a paddle switch that rests against the face of the pile.

Pelletizing

Material from the bedding plant is conveyed to a small surge bin at the head of the pelletizing plant. The apron feeder under this bin discharges material at a rate of 100 tons per hour to a 5-by 7-foot American Ore Reduction pug mill. Water is added to the pug mill to give the material the necessary moisture content for proper pelletization. The water addition rate is controlled by a valve-operated flow-meter at the pelletizer discharge. After the material goes through a 8-by 15-foot pelletizing drum operating at 10.5 revolutions per minute, it drops into a 7-by 30-foot, oil-fired, rotary dryer, turning at 11.3 revolutions per minute. The belt carrying the pellets from the dryer is hooded to collect the steam and dust. After being transferred to another conveyor the pellets are transported to two 350-ton storage bins near the roaster building.

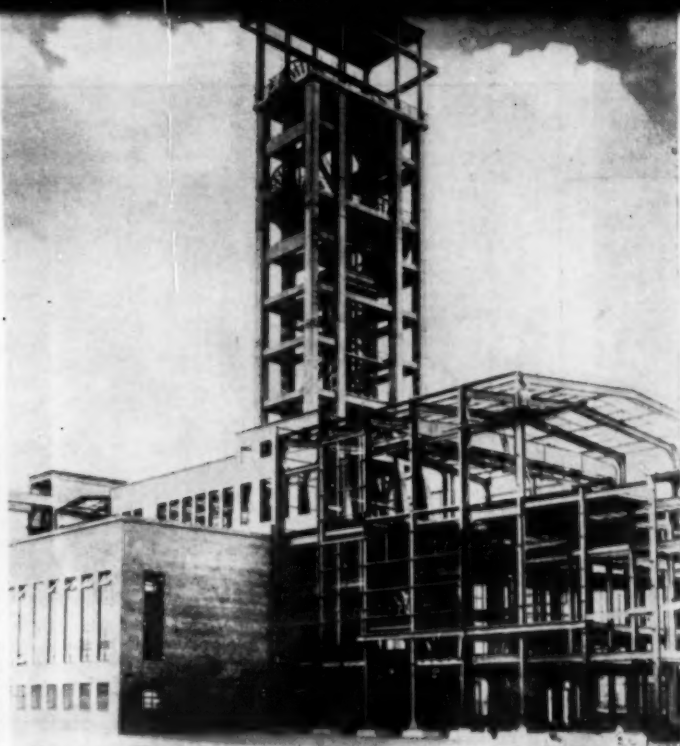
Feed Variation Reduced

In general, the new preparation plant has met all expectations and it appears that further improvements can be made in the future. The control offered by the new plant makes it possible to carry a nearly uniform charge of proper metallurgical balance through the plant for long periods of time; therefore, all subsequent operations are maintained at maximum capacities.

MINING WORLD wishes to thank P. C. Feddersen, general manager of Bunker Hill and Sullivan Mining & Concentrating Company, for granting permission to publish this paper. Thanks are also due to Harold E. Lee, smelter general superintendent; George W. Dunn, superintendent of operations; D. F. Ingvaldstad, superintendent of metallurgy, and Glenn Blickensderfer, superintendent of the preparation plant, for the help they gave in gathering this information.



KOEPE HOISTS are of two types. The picture at left illustrates a tower-type with the Koepe wheel mounted in the top of the head frame. The picture at right shows a ground-type installa-



tion where the hoist is close to the shaft in building at left. Note the two sheave wheels mounted one above the other in same plane.

Miners Awake to Koepe Hoist Advantages

BY T. H. PETCH

Koepe or friction hoists were first used at Hanover, Germany in 1877. Because the advantages of this type of hoist are, at long last, being more fully realized by the mining industry, there has been a recent trend to equip new mines from Sweden to South Africa and from Northern Rhodesia to Michigan with this old and proven equipment. The table at the end of the article gives complete details for several of these installations—either recently completed or under construction.

The advantages of Koepe hoisting include: less power required with fewer peak loads, less rope wear, lower rope costs (smaller diameter ropes with multiple rope units), and increased safety (multiple rope hoists).

Another reason for increased use of this type of hoist has been the perfection of the system so that multiple ropes can be used. Many of the newer hoists are using multiple ropes and others are in the planning stage.

Koepe hoists use two cages or skips, as shown in Figure No. 1, or some-

times one cage or skip with a counter-balance weight. There are no drums on which the rope is wound; instead the drive is produced entirely by friction between the rope and the Koepe wheel.

Balanced Hoisting Helps No Slip

It is essential to have balanced hoisting and it is moreover generally essential to have a balance rope, that is to say the loop of rope attached to the underside of the two conveyances. This rope is usually equal in weight to the full suspended length of the main rope. Figure No. 1 shows the simplest form of Koepe hoist with one rope. The wheel is mounted directly over the shaft in a tower and a deflecting sheave is then required to give correct rope centers. With the above condition fulfilled and with a sufficient depth of shaft (this commonly has to be greater in depth than about 1,500 feet), the principle requirement of Koepe hoist can be met, namely, the complete absence of slip on the Koepe wheel. With properly designed equipment, slip never occurs during normal hoisting. It is, therefore, entirely a matter of correct design and the ob-

taining of the correct ratio of the rope tensions on either side of the wheel, or the correct values for:

$$\frac{T_1}{T_2} = e^{\mu \theta}$$

Where T_1 is the rope tension on one side of the wheel.
 T_2 the rope tension on the other side.
 μ is the coefficient of friction.
 θ the angle of arc of contact on the wheel.

Permissible accelerations and decelerations are calculated for a coefficient of friction value $\mu = 0.2$, which is much less than the normal coefficient of friction between the rope and sheave. Usually correct tension ratios can only be achieved with balanced hoisting conditions and the provision of a balance rope.

Power Requirements Less

The power required for equivalent conditions is less on a Koepe than on a drum hoist because:

- (a) there is less inertia to overcome, chiefly because of the lighter weight of Koepe wheel construction, and
- (b) there is no out-of-balance weight of rope.

The British Thompson-Houston Co. Ltd.
 Rugby, England

FEBRUARY 1955

[World Mining Section—33]

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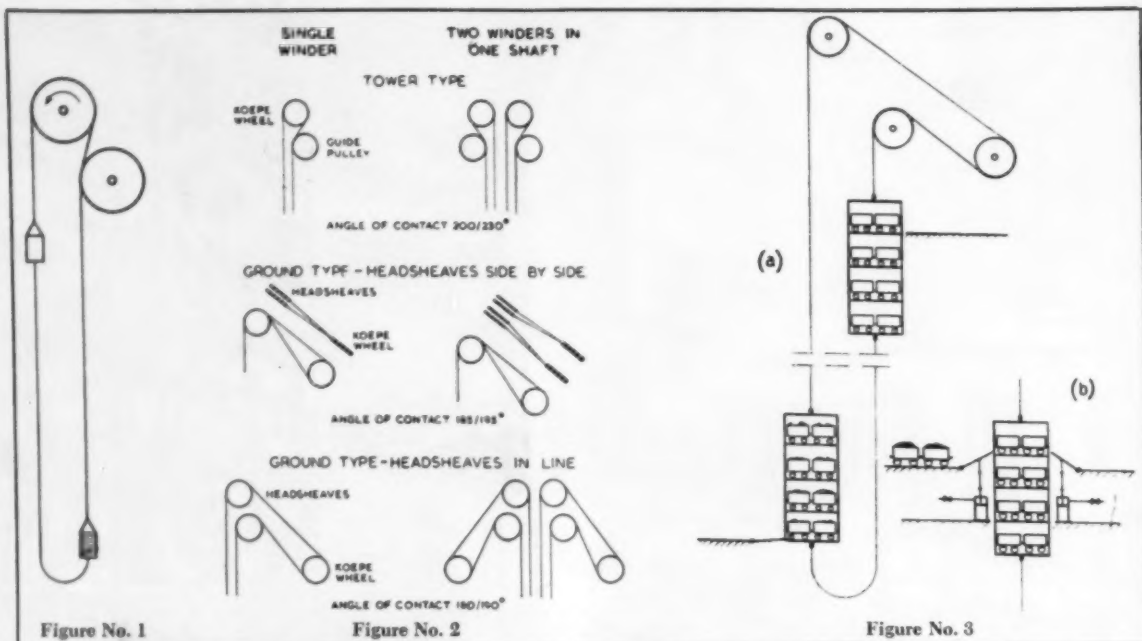


FIGURE NO. 1 is a simplified diagram of Koepe hoist showing two cages. Figure No. 2 illustrates the two main types of Koepe hoists (ground and tower) and several methods of installation.

Figure No. 3, diagram (a), shows one of the methods for loading and unloading multiple-deck cages. Diagram (b) shows a proposal made in Holland for lowering flaps by air cylinders.

One of the advantages of the Koepe hoist is now apparent, namely: smaller power input.

Ground And Tower Types

There are two main types of Koepe winders, the tower type and the ground type, and, as shown in Figure No. 2, both types can be arranged in several ways. The tower-type is built immediately above the shaft in a tower mounted on the shaft collar; the conventional headgear and sheaves are then absent. Instead, below the Koepe sheave is a deflecting sheave which not only has the purpose of bringing the ropes to the correct centers for the shaft compartments, but also has the advantage of increasing the arc of friction contact on the Koepe wheel itself.

The ground type Koepe hoist is placed on the ground like the conventional drum hoist, but the limitations associated with rope angling may be different. The sheaves may be placed side-by-side, in which event the angle of the rope leads should not be greater than $1\frac{1}{2}^\circ$. On the other hand, the sheaves may be placed one above the other, and rope angle no longer a problem because the sheaves are in the same plane as the Koepe wheel. With the sheaves one above the other, and rope angle no longer a problem, the hoist may then be placed close up to the shaft collar. This makes it possible to consider combining the

duties of top man and hoisting engineer in one man because the engineer is now in a position where he can see the cages when they arrive.

Multi-Rope Hoisting

The further form of Koepe hoist, better known as the friction hoist, is the one which has more than one rope. The greater advantage of this type of hoist is that a number of small ropes can be used instead of one large one. This means that a reasonable value of the ratio of driving sheave diameter to rope diameter can be obtained with a much smaller driving sheave. For equivalent duties, whereas for a single rope the diameter would probably have had to be 26 feet, with multi-ropes the diameter can be reduced to something of the order of 10 to 14 feet.

This means that a tower to contain the hoist can be of much smaller dimensions and therefore much cheaper. It means also that the deflecting sheave can commonly be omitted because it becomes possible to make the size of the driving sheave to suit the rope centers in the mine shaft. Moreover, it gives added security because the breakage of a rope does not involve the dropping of the conveyance as must be the case with a single rope.

A further advantage is that the driving motor may be smaller because the driving sheave runs faster. This ap-

plies whether the motor is to be for direct-drive or is to drive through gears. For the large diameter of the sheave of a single rope hoist, it is commonly found that the speed is no more than 35 revolutions per minute which, with single reduction gears, requires a rather low-speed and large size driving motor. For the multi-rope hoist with a small diameter wheel, speeds of rotation are increased by as much as twice so that driving motors of a reasonable size can be used.

Multi-Level Hoisting

The Koepe hoist can be used with cages or skips in balance and is then suitable for single level working. Where multi-level working is required, a cage and counterweight system is employed. In this case, of course, every alternate operation is unproductive, but if the cage or skip is made to have double the cross-sectional area it can lift twice the load. Hence, the rate of output can be the same as for double conveyance balanced winding where the cross sectional area of each of the two conveyances must be half that of one big conveyance. That the one big conveyance can be as big as this is made possible by the fact that the balance weight can be of very small cross-sectional area. Note that the weight of the balance weight is usually equal to the sum of the weight of the conveyance and half the weight of the normal pay load. Hence

the out-of-balance weight is always the same.

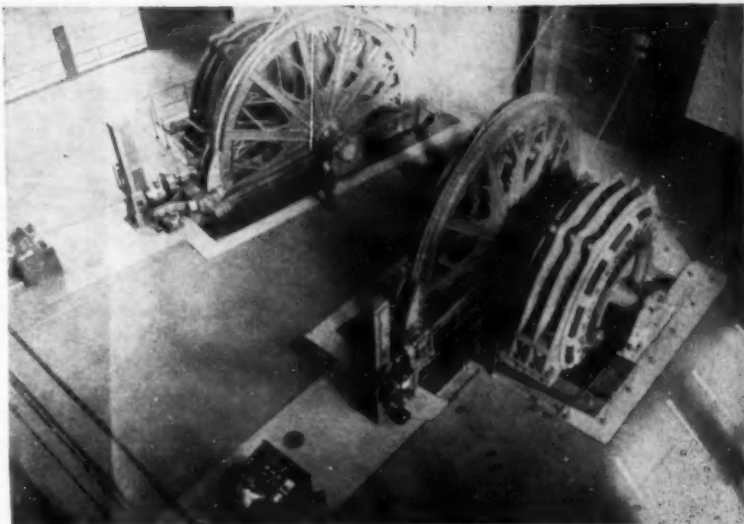
Precision - type, double - reduction gearing with the motor drive concentric with the driving sheave shaft will be a common arrangement because of this also, as in the case of tower mounted equipments, is expected to give a less costly tower construction.

Multi-rope hoists may be ground-mounted provided the headgear sheaves are placed one above the other. A hoist of this type is being built for use in Scotland.

Shaft conveyances may be cages (and multi-deck types are common) or bottom opening skips. In general, overturning skips are unsuitable for use with Koepe hoists because some of the weight of the skip is taken by the dumping horns when the skip is being tipped and this is apt to upset the rope tension ratios, which must be correct to give satisfactory driving without slip of the rope on the driving sheave. The bottom discharge skip is, therefore, universally used for Koepe hoists. The overturning skip requires restricted speed when entering the horns so that the reaction on the horns is not excessive; with the bottom discharging skip, the reaction is so much reduced that not so much speed restriction is necessary and less time is wasted when maneuvering to discharge.

Electrical Controls

On the Continent no Lilly controller is used or other separate overspeed and overwind device; instead, an electrical equivalent is incorporated in the depth-indicator assembly, and because protection is obtained from electrical



GROUND-TYPE KOEPE HOISTS installed at a European mine—a good example of this type installation. Direct-drive electric motors with Ward-Leonard control are used. Revolving at 38.2 rpm, 3,500 to 7,000 horsepower is required.

circuits arrangements are made for these circuits to be tested daily. In England, Lilly controllers are provided to give protection against overwind and overspeed.

A Koepe hoist, as such, is not suitable for sinking purposes, but an arrangement frequently used on the European Continent for shaft sinking is to fit, initially, a reel on each side of the Koepe sheave and to use the reels with flat ropes until the shaft is sunk; after this, the reels are dismantled and the Koepe wheel is used for Koepe hoisting. On the other hand, the driving drum of a multi-rope fric-

tion hoist may be used directly for sinking.

Guides, Loading, Rope Stretch

Shaft guides are usually tapered at the top and bottom of the shaft in such a way that if an overwind occurs the first thing that happens is the wedging of the down-going conveyance in the guides. This tends to make the ropes go slack so that slipping on the Koepe sheave can occur, a condition which reduces the risk of the upcoming conveyance being overwound. This conveyance, in turn,

(Continued on page 68)

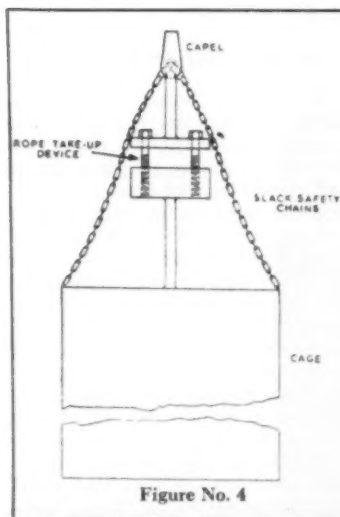


Figure No. 4

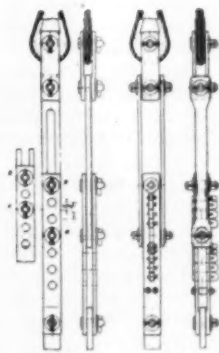


Figure No. 5

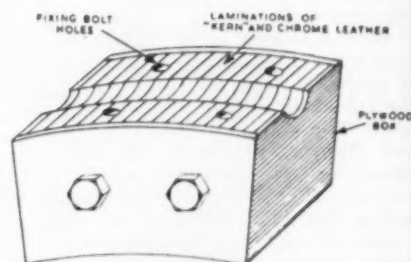
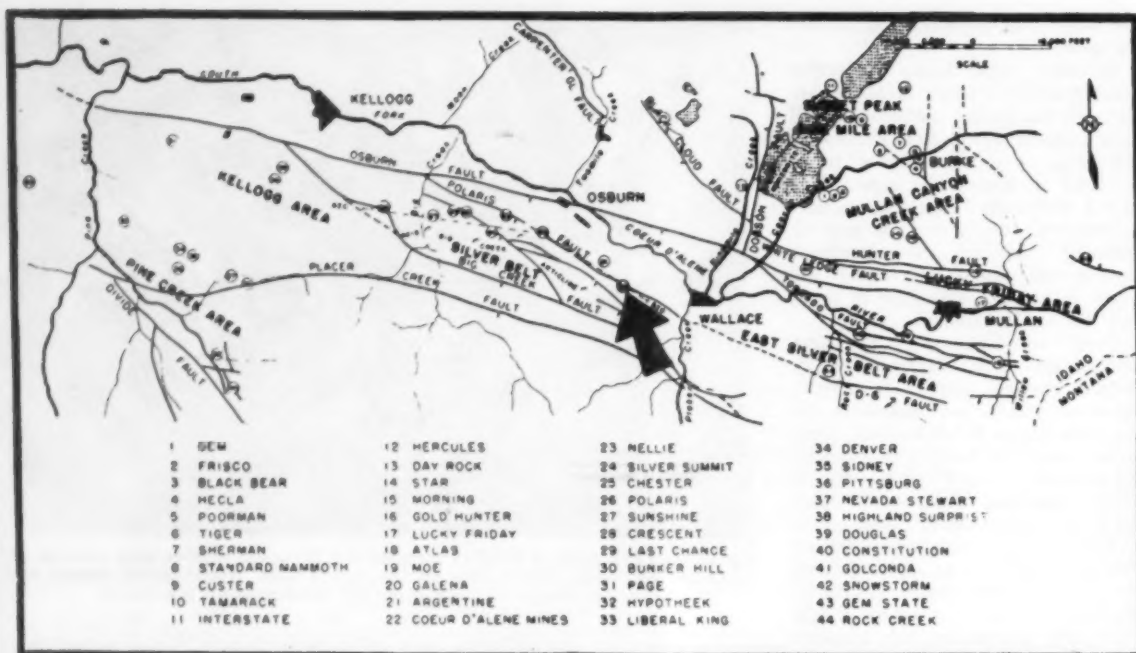


Figure No. 6

FIGURE NOS. 4 and 5 show several methods used to take up rope stretch. All such devices require adequate room above the cage when hoisted into the headgear. Figure No. 5 (b)

shows a method of equalizing the load carried by multiple ropes. Changing position of the pegs varies the rope length. Figure No. 6 shows a built-up rope tread used on wheel.



INDEX MAP of the Coeur d'Alene mining district, Idaho, showing mines and major faults. The black arrow points to

the Galena development in the Silver Belt. Circled numbers are mine locations with numbers and names at bottom.

How a Geologic Gamble Paid Off

BY J. E. BERG

There is a new deep mine in the Coeur d'Alenes, the Galena Unit of American Smelting and Refining Company. This new mine is the culmination of eight long years of costly and difficult work by a trained engineering staff fully supported and adequately financed by several mining companies. Above all, it took the geologists' convictions that totally blind ore shoots could be developed in the area—happily they were.

What is referred to as the Galena Unit is the consolidation of a number of properties under the ownership of the Vulcan Silver-Lead Company, and under lease to the American Smelting and Refining Company and Day Mines, Inc., as a joint venture. The story of this new development begins back in 1946 and is still going on.

First, let us examine the setting and previous history of the present Galena Unit. The property is in the Placer Center and Evolution mining districts about a mile and a half west of the town of Wallace, in the steep hills ris-

ing south of the Coeur d'Alene River. (See Index Map.) It lies astraddle of Lake Gulch wherein are located, a mile south of U. S. Highway No. 10, at an elevation of 3,100 feet, the mine plant and mill. The Galena Unit includes claim groups formerly known as the Chicago-Boston, Tincup, Killbuck, Vulcan, and Silver Range.

Although many of the claims date back to the 1880 boom days of the Coeur d'Alene area, serious mining did not begin at the Galena until, in 1917, Eugene R. Day and his associates opened the first ore body on Chicago-Boston ground. In 1918, the Callahan Zinc-Lead Company secured an option on the property. Gradually over the years this company acquired other claims and extended the Galena workings laterally and downward until by 1932 the mine had reached a depth of some 1,600 feet below the shaft collar, and was explored on no less than 10 levels by several miles of underground workings.

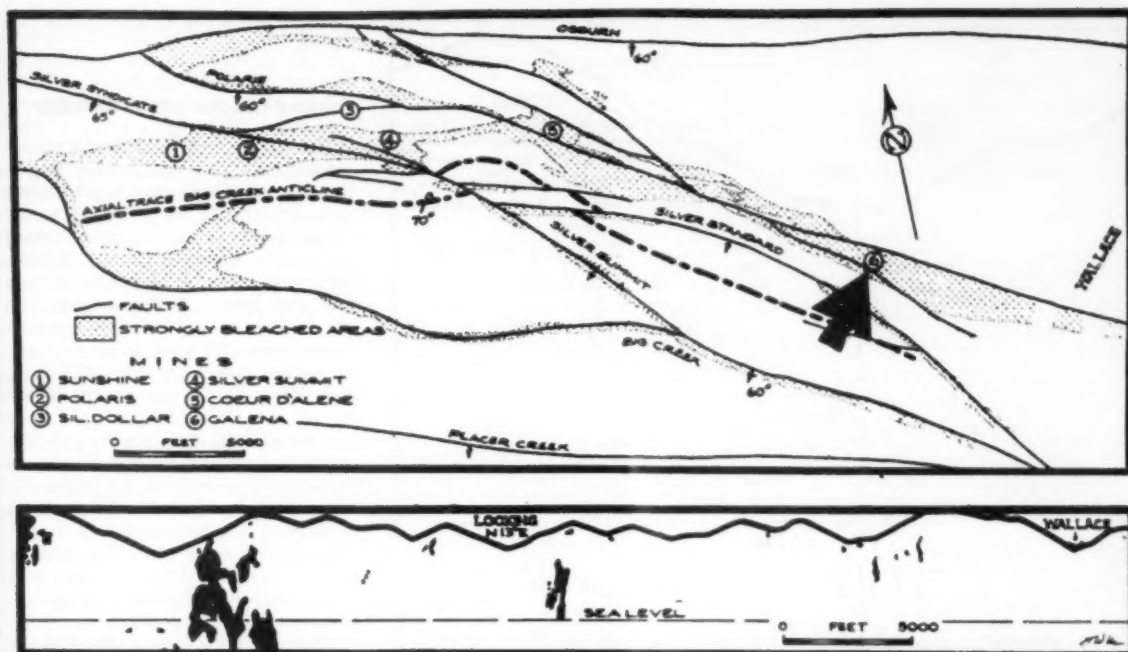
The mine was idle during the depression years, but in 1937 and 1938 Callahan Zinc-Lead Company reopened the property to the 600 level and did a certain amount of work at that horizon and in the Vulcan tunnel. These various activities resulted in a

total production of approximately 137,000 tons of ore, from which were recovered 474,000 ounces of silver, 12,000,000 pounds of lead (3.4 ounces silver and 4.38 percent lead per ton), and small amounts of gold and copper. Thereafter, the property lay idle until 1947.

Why Silver Belt Attractive

Although production from the old Galena mine was largely lead ore, the property physically lays within the limits of the district known locally as the Dry Belt from its lack of lead; or, since the discovery in 1930 of high-grade silver ore on the 1,700-foot level of the Sunshine mine, as the Silver Belt. With the discovery of the Sunshine bonanza, the Belt became more attractive to mining men, and by 1937 the Sunshine, Polaris, and Crescent mines were producing silver ore regularly. New impetus was given mining in the Silver Belt by the discovery in 1943 of the Chester vein ore bodies at the 2,700-foot level of the Sunshine mine. Silver ore has been discovered and mined in the Polaris Mining Company's deep ore bodies, at the Silver Summit Mining Company, the Silver Dollar Mining Company, Coeur

General Manager, Northwestern Mining Department American Smelting and Refining Company, Wallace, Idaho. Presented at Northwest Mining Association Convention



SILVER BELT with Galena Unit located by black arrow. Plan elevation at 2,750 feet. Generalized vertical projection shows

most of ore shoots. Plan after Shenon and McConnel (1939) and Sorenson (1951). Vertical section from Sorenson (1947).

At Silver Belt's Vulcan Mine

d'Alenes Mines Corporation, Metropolitan Mines Corporation, Sunshine Consolidated, Inc., and Silver Syndicate, Inc., and deep development is currently underway in the Crescent, Silver Summit and other properties. Since 1900, the first year for which figures are available, through 1950, according to the last available compilation, total production from this "unfavorable" Dry Belt has been about 5,460,000 tons of crude ore from which were recovered 145,000,000 ounces of silver, 87,000,000 pounds of lead, 45,000,000 pounds of copper (26.6 ounces silver, 0.8 percent lead, and 0.41 percent copper per ton) and smaller amounts of zinc, antimony, and gold.

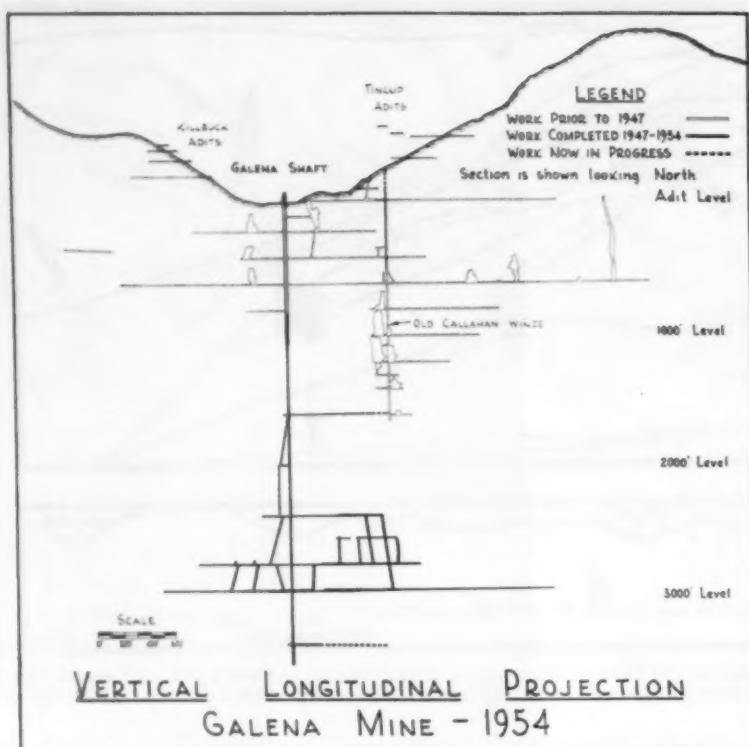
The Silver Belt of the Coeur d'Alenes lies south of the Osburn fault and north of the Placer Creek fault, westward from Wallace to near Kellogg. (See Silver Belt Plan and Section.) In that area, the single, most encouraging factor has been the occurrence of major quantities of silver, lead and copper mineralization in totally blind ore shoots, in some cases as much as 4,000 feet below the present land surface. These ores occur in the pre-Cambrian sedimentary rocks where these are compressed into an

anticline whose axial plane strikes roughly easterly and westerly and is overturned to the north. Thus, the Big Creek anticline, is sliced by a number of fault zones that trend northwesterly-southeasterly, and tend to form links between the Placer Creek fault on the

south and the Osburn fault on the north. The mineralization occurs along the fault structures and in numerous east-west trending veins that bear both shear and tension relationships to the diagonal faults. The more productive rocks in the Silver Belt



GALENA HEADFRAME and surface installations looking south. The building in the center is the office, warehouse, and dry. The hoist house is barely visible at far left behind the headframe. Timber sheds on right.



GALENA SHAFT WORKINGS along a vertical projection. Work done before 1947 is shown by double lines; that after 1947 by solid black lines.

have been the St. Regis and Revett quartzite formations, while the Wallace formation, stratigraphically younger and largely shaley, has to date been unfavorable. Mineralization is associated with strong hydrothermal alteration locally known as bleaching.

A detailed discussion of the Galena geology was available to ASARCO through the work of its own geologic staff, C. P. Pollock and Keith Whiting, and through the work done by P. J. Shenon and R. P. Full for the Callahan Zinc-Lead Company. While it was obvious that the geology was favorable to the occurrence of deep ore shoots, it also indicated numerous operating problems. The work would be expensive, there would be a high risk element with little prospect of substantial salvage, if no discovery were made. Therefore, a blind orebody, to be attractive, would have to be of large magnitude.

Agreement For Development

After careful analysis of the operating problems indicated that they probably could be licked, the senior officials of the Smelting Company, late in 1946, concluded an operating and profit-sharing agreement between the American Smelting and Refining Company and a new corporation formed

by Callahan Zinc-Lead Company for that purpose, the Vulcan Silver Lead Company. This agreement, which is a matter of public record, is essentially a 30-year renewable lease that places in the lessee sole authority and responsibility for the operation. The lessee was required, under the terms of the contract, to sink a shaft to approximately sea level, or about 3,000 feet; and also to complete a minimum of 5,000 feet of drifting and crosscutting at that horizon. It was agreed that a minimum of \$600,000 would be expended in connection with this work, after which the lease could be terminated on giving due notice if the continuance of such work became economically unsound or impracticable. The Smelting Company is fortunate to have as its partner in this operating agreement Day Mines, Inc. of Wallace, Idaho. As is so frequently the case in the metal mining business, the amount of money and effort which had to be committed before any definitive results could be obtained turned out to be substantially greater than the original commitment. Unquestionably, therefore, a major factor in the successful completion of the Galena deep development has been the unflinching faith and support of the

financial officers of ASARCO and Day Mines.

Faulted Ground Slows Sinking

Execution of the Galena deep project logically falls into several stages, the first of which was rehabilitation and extension of the old shaft to the target depth of 3,000 feet. Surface preparation started in January of 1947, but it was not until December of that year that actual sinking began. The old shaft consisted of two compartments to the 300 level, three compartments from there to the 800 level, and, although in fair condition, required considerable clean-up before new work could start. The first job was enlargement to four compartments in line by raising out from the 800 level. Above 800 the shaft is in the southern or hanging wall of the Galena strand of the Polaris fault zone. The shaft is oriented with its long axis east and west, parallel to the bedding planes, and shearing of the rocks.

Sinking began, using the Riddell clamshell mucker which worked very well for a time. It was anticipated that the Galena fault, like the Polaris fault zone elsewhere in the Silver Belt, would dip consistently to the south, leaving the shaft a short distance below 800 level and giving good shaft ground in the north or footwall. This was, unfortunately, not the case, for the Galena fault turned over, dipped north, then back to the south, forming a zone of close sheeting and heavy, squeezing ground. With the long shaft axis aligned parallel to the sheeting it became impossible to leave out enough compartment dividers to use the Riddell mucker. Finally, at 1,080 feet, it was decided to shorten the shaft axis leg, swinging the service compartments around to the north side, sinking thereafter a four-compartment square shaft, using semi-jacket sets and abundant cedar squeeze blocking. Needless to say, the Riddell equipment could no longer be used and the shaft was hand mucked. The ground continued heavy so that progress was difficult, slow and costly all the way to the 3,000-foot level, where another major strand of the Polaris fault zone was disclosed. Thus, it was not until August of 1950, some three and a half years after the beginning of the project, that the initial lift to 3,000 level was completed and the second stage of deep development could begin.

South Cross Cut Finds Lead

From the deep level experience of other Silver Belt mines it was felt that the zone of mineralization along the Polaris fault would probably persist

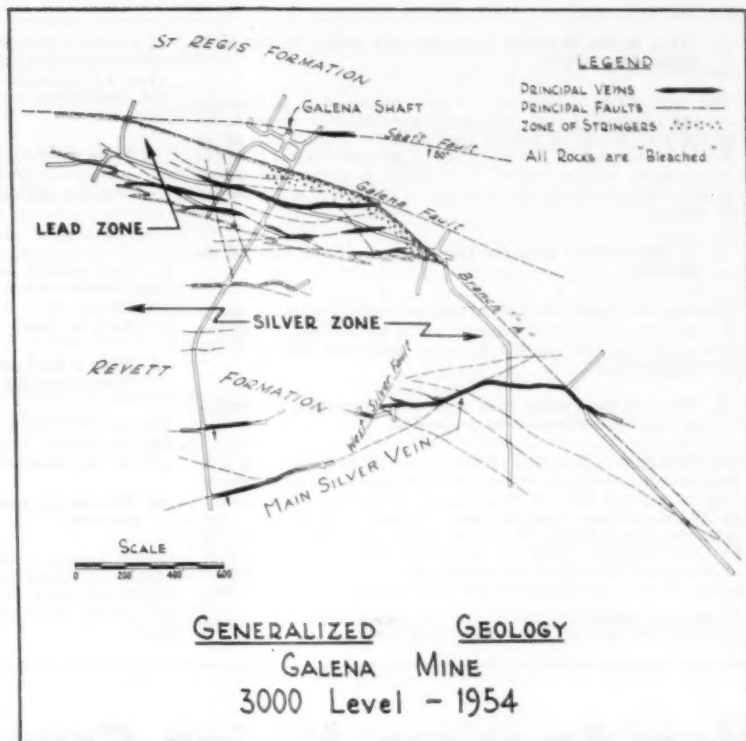
in depth, but that individual veins found in the upper workings might not. By February 1951 a limited amount of crosscutting, principally south of the Galena shaft, had been accomplished, and substantial lead mineralization discovered; in fact, one vein actually entered the shaft from the north side, in the third set above the 3,000 level. There now were a number of lead-bearing veins in quartzite but no relationship between this mineralization and anything in the upper part of the mine was apparent. Nevertheless, the discoveries justified enlargement of the small sinking plant that had served from 1947 to 1951.

The third stage of Galena project was, then, the installation of a larger hoist, compressor plant, change house, shops, and the hundred and one other items that go to make up a modern mine plant. The hoist installed is a 900-horsepower, Nordberg, d.c. electric, second-motion machine with a Ward-Leonard control and has a rope speed of 900 feet a minute, winding 4,500 feet of 1½-inch rope on 12-foot-diameter drums. It is currently hoisting 8-ton capacity, bottom-dump skips hung above the main cages. The inside dimension of the hoisting compartments at the Galena is 4 by 4½ feet, and this factor, as well as the squeezing ground, obviously limits the size and capacity of the skip which can be hoisted. It was necessary to retimber part of the new shaft to utilize the increased hoisting speed.

During this construction period, a considerable amount of diamond drilling was done which allowed us to outline and make a preliminary estimate of tonnage and grade of lead mineralization which had been found. I think, in all honesty, we should say that further work has completely changed our ideas from these early estimates. During this enforced shut-down period the company also completed some surface work and reopening of upper tunnels, and although we acquired a much better idea of the Galena geology, we were still unable to utilize it at the 3,000 level because of the tremendous vertical gap which separated our near-surface observations from our development level. It is interesting to note that to this time, June of 1952, we had not as yet found any silver ore.

Major Development Starts

With these installations complete, the fourth stage of the project could be started. Serious exploration, which could not start until June of 1952, 5½ years after beginning the project, consisted of drifting out the known lead



GENERALIZED GEOLOGY of the 3,000-foot level of the Galena Mine showing the rock formations, principal veins, faults, and ore zones.

veins and extending openings from which further crosscutting might be done. A new part of the development program was the beginning of a raise system in order, ultimately, to establish a second opening for safety purposes, material handling, and ventilation. The company has made every effort to push these raises as rapidly as points of attack for the openings could be developed. We have appreciated the able advice and assistance of the mine inspector's office of the State of Idaho during this difficult period.

The known lead zone mineralization on 3,000 level was largely developed by early 1953 and in February of that year a crosscut from the eastern workings intersected a silver-bearing siderite vein of good width and grade. By June 1953 this silver vein had been opened eastward to a strand of the Galena fault and westward to a point where the vein becomes low grade, a total distance of nearly 700 feet.

Develop For Tonnage Production

Throughout the rest of 1953, development of both the silver vein and lead vein zones proceeded, while at the same time down-hole diamond drilling was undertaken and which established that the silver vein struc-

tures persist at least to the 3,400 level. By late in the year it was realized that the Galena mine could be brought into a regular production basis, and the fifth stage of the Galena project may then be said to have begun, with an increase in the amount of pre-production development and a deferring of actual exploration. By reference to the accompanying longitudinal section of the Galena mine as it will be when connections are completed, the magnitude of this work may be appreciated. It was necessary to complete a system of raises from the 3,000 level to the 1,600 level, to reoccupy the old Callahan winze extending from 600 to the 1,600 level, to raise this winze from 600 to the Galena tunnel level, and to effect a connection on 1,600.

During the initial periods of exploration and development, all muck which was economically justifiable was handled through a little mill, owned and operated by Zanetti Brothers, which lies 700 feet from the collar of the Galena shaft. In April 1954, ASARCO and Day Mines purchased this mill from the Zanettis and began enlargement to its contemplate capacity of 350 tons per day. To the end of October 1954, a total of 98,000 tons

(Continued on page 70)

1. What is the Brazilian Government's policy in regard to mineral resources?

The outstanding feature of the present policy is to increase the use of governmental and quasi-governmental agencies, together with Brazilian private capital in the exploitation of its mineral resources. It is an attempt to prevent control of these resources by foreign capital. This policy is particularly strong in reference to petroleum; it is not so definite in other classes of mining.

2. To what extent does the Government aid the mineral industries?

Through the Department of Mines and other Federal agencies the government is giving valuable aid to the prospector and the mine operator both in the technical field and marketing of mineral products.

3. What are the mining code regulations regarding ownership of mineral concessions or properties?

The Brazilian Constitution of September 18, 1946 provides that authorization to engage in mineral exploration and development may be granted only to Brazilians or to companies organized in Brazil, under Brazilian laws.¹ Exploration permits are authorized for a period of two years and may cover an area up to 1,000 hectares. They are renewable for additional periods of two years. When work of exploration is completed, a detailed report must be submitted to the Government for the granting

¹ Companies organized in Brazil may be entirely composed of non-Brazilians, but directors must be residents of Brazil.

of a mining concession for exploitation of the ore deposits. A concessionaire must commence operations within a year. In event of expropriation for public necessity or social interest, the constitution provides that just compensation shall be paid in money.

4. What limitations apply to foreign capital participation in mining enterprises and to the export of profits and return of invested capital?

Foreign capital participation in mining enterprises must be carried by forming a Brazilian company. Two-thirds of salaried or wage earning employees must be Brazilian or aliens who have resided more than 10 years in Brazil and two-thirds of the payroll must be to Brazilians. Managers must have legal residence in Brazil.

5. What is the Federal tax on mining concessions and does the State collect a royalty on mineral production?

The tax on mining concessions is based on acreage and varies for the metals, fuels and nonmetals. It is relatively unimportant as compared with the other taxes.

6. What is the production and export tax, if any, on mineral products?

Quartz crystal is the only mineral that pays an export tax which is charged to pay for quality classification. Mining is subject only to a single tax which may not exceed 8.0 percent ad valorem of an assessed value at the mine mouth, of mine product.

How American Mining Companies Can Now Operate in Brazil

By CHARLES WILL WRIGHT

Brazil has been in the limelight because of the recent Inter-American Economic Conference at Quitandinha, Brazil where a program was formulated which will eliminate discriminatory taxes on United States Business operating in Brazil and other Latin American Republics.

Also planned is a new International Finance Corporation with \$100,000,000 for technical assistance for industrial projects.

In view of these developments and growing interest in developing Latin American minerals, MINING WORLD has had Charles Will Wright prepare this exclusive report on minerals in Brazil and the facts of Brazilian laws relating to mineral opportunities and taxation for prospective investors.—Ed.

Former member of the Foreign Minerals Division, U. S. Bureau of Mines. Now with World Mining Consultants, Inc.

Larger than continental United States, with less than one-third its population, Brazil is a land of undeveloped potential mineral wealth. Soon after the beginning of World War II, Brazil came into prominence as a source of many rare minerals essential to our war industries. All of our requirements of quartz crystals for electronic and radio industries, most of the mica for electrical equipment, and an important percentage of industrial diamonds came from Brazil. The beach sands north of Rio de Janeiro yielded a considerable tonnage of ilmenite, zircon, and monazite, while the states north of Bahia were the main sources of tantalite and beryl, plus smaller quantities of tungsten and tin.

At the end of the war period, decreased demand and lower prices forced many producers of these minerals to suspend operations thus affecting Brazil's trade balance.

Brazil, however, is fortunate in having some of the world's largest deposits of high-grade iron ore and manganese ore as well as nickel ore with reserves estimated in tens of millions of tons. It can also boast the deepest gold mine in the Americas (San Juan del

Rey) and gold fields containing veins and conglomerate reefs similar to those in South Africa. Known gold and diamond placer deposits may eventually warrant large-scale dredging operations along the tributaries of the Amazon.

Of immediate importance to Brazil's welfare is the agreement concluded a few years ago between Bethlehem Steel Company and the Brazilian Government, for a 50-year concession to develop the Amapa manganese deposits. Under this partnership agreement, Bethlehem maintains 49 percent of the stock in the new company, Industria e Comercio de Minerios S.A. (ICOMI), agrees to conduct the explorations, build a 90-mile railway from the mine to the Port of Macapa, and provide port installations to ship 5,000,000 tons during the 10-year period after production starts. It is assumed that most of the ore will be shipped to the Bethlehem plant at Sparrow Point, Maryland. The Bethlehem Steel Company has arranged a loan of \$65,000,000 from the Export-Import Bank to cover a large part of the cost for the railway and port installations. Estimates indicate that it will take from two to three years to complete the project. Bethlehem has also arranged to sell part of the manganese ore to General Services Ad-

7. Are dividends or profits subject to additional taxes?

Dividends on bearer shares are subject to 15 percent tax withheld at source in addition to normal tax on business income.

8. What are the Provincial, State, Municipal, or other local taxes on mining enterprises?

A limitation has been placed on the right of the Province, State, or Municipality to collect a tax on mining enterprises. The combined total may not exceed 8.0 percent of the net value of the production.

9. Does the Government waive certain taxes to encourage new mine production?

Only on the exemption of import duties on machinery and equipment.

10. What is the income and surtax in percentages of profits on large and small mining operations?

The Federal income tax for companies, regardless of nature, is collected on net profits as follows:

Up to 100,000 cruzeros	— 10 Percent
100,000-500,000	" — 12 Percent
Over 500,000	" — 15 Percent

Deductions are allowed for all production expenditures, interest on debts, reserves for losses, reserves for mine depletion and for depreciation. Gold miners do not pay income tax. In addition to normal tax on income are dividends or profits subject to an export tax?

Dividends on bearer shares are subject to 15 percent tax withheld at source. Profits reinvested in business are exempted from withholding tax.

11. What are the foreign exchange controls and rates as applied to sales of mineral products abroad and the current exchange rates?

Federal control on the dollar returns from the sales of mineral products and on the export of profits has been in effect since 1931 and the exchange rate and availability varies with the shifting balance of trade.

The official rate of exchange is the basis on which payments are made to exporters of mineral products. The open market rate of exchange is much higher.

12. To what extent is labor under Union control and does the Government adopt a neutral attitude in labor-management relations?

The unions are under a president selected by the Ministry of Labor. The government takes an active part in disputes between labor and management by means of Labor Court and Ministry of Labor.

13. Is there a minimum wage for labor and what are the obligations to labor in case of a suspension of operations?

The minimum wage varies according to locality (from 1,200 cruzeros per month up). Working hours are normally eight hours, plus a maximum overtime of two hours for coal mines, six hours portal to portal. Overtime is paid 25 percent higher rate than for normal hours. Night work is paid 20 percent.

ministration for the Government stockpile. The ore reserves in the Amapa deposit that can be surface mined are estimated at 5,000,000 tons and from 10,000,000 to 15,000,000 tons of ore to be mined by underground methods.

A similar agreement is now being concluded between the U.S. Steel Corporation and the Brazilian Government to exploit the Urucum manganese deposits in the State of Mato Grosso. These deposits contain 33,000,000 tons, most of which will have to be mined by underground methods.

The manganese mine of Morro de Mina at Lafayette has been operated many years by the U.S. Steel Corporation and when the Urucum mine starts shipping its manganese ore to the United States that from the Morro de Mina will be used by the Brazilian steel industry and for ferro-alloys.

High-grade iron ore deposits in the State of Minas Gerais have reserves estimated at many billions of tons. Because of its low phosphorus and silica content this hematite ore brings a premium on international markets. The Itabira mine is the principal producer for export trade and over a million tons a year go by rail to the port of Victoria for shipment to the United States and England. Competition from Venezuela and Labrador in world markets and the greater distance from Brazil to the consumer nations limits export trade.

A private investor in contemplating development of any phase of Brazil's vast mineral wealth should be familiar

with that government's attitude and conditions under which he must operate. In order to determine these essential factors, a U.S. Bureau of Mines questionnaire was submitted in 1952, through the American Embassy, to the Brazilian Government, mineral agencies, and to numerous active mining companies. The answers were reviewed and consolidated by the Minerals Attache of the United States Embassy staff in Rio de Janeiro. The questions and answers are given in the boxes at the top of these two pages.

Since these questions were answered, new decrees more favorable to foreign investors ready to risk capital in the development of Brazil's mineral resources have been enacted, namely:

Law No. 1807 of January 7, 1953 which establishes the free exchange market, free entry, and free return of capital to its country of origin and its dividends at any time in unlimited amounts, and

Law No. 34893 of January 3, 1954 which classifies foreign investments in four categories: 1) those of indubitable interest; 2) of special

interest; 3) of relevant interest and 4) ordinary investments.

In May 1954 the then President Vargas extended special privileges relating to remittances of profits and capital repatriation to the following investment categories:

11—Extraction, production, and beneficiation of export products.

12—Exploration of mineral resources and study of the utilization of natural resources.

Brazil's present attitude toward investment of foreign capital in the mineral industries is considered particularly attractive.

This summary of Brazil's mineral policy is presented because of the awakened interest in its mineral supply sources and to urge private capital to join with mine owners in the development and exploitation of their properties. The economy of Brazil is heavily dependent upon exports and desperately short of development capital. Brazil is capable of feeding her fast growing population and is an important exporter of foodstuffs. The country is richly endowed with hydro-

Comparison Of United States Capital Investments In Brazil, Peru, and All Latin American Republics From 1950 Through 1953

Year	All Latin American Republics	Brazil	Country Peru	Percent Total Investments	
				Brazil	Peru
1950	\$4,735,000,000	\$ 644,000,000	\$145,000,000	13.6	3.0
1951	5,176,000,000	803,000,000	197,000,000	15.6	3.8
1952	5,758,000,000	1,013,000,000	230,000,000	17.5	4.0
1953	6,001,000,000	1,003,000,000	259,000,000	16.7	4.3

The tough ones

come to CARD

200 ROTARIES
HAUL POTASH FOR
INTERNATIONAL MINERALS
& CHEMICAL CORP. POTASH DIVISION

Thirty new Rotary Dump cars recently placed in service bring to an even 200 the CARD Rotary Dump Mine Cars now in underground use at Carlsbad. Potash does not give the impact punishment CARD cars are taking in so many hard rock operations, but conditions are still tough.

Trains are long; haulage distances constantly increase; grades grow steeper. To keep in full operation economically, the cars have to be easy rolling, strong of frame, and solidly built against mild corrosion. All wheels are Timken bearing equipped and live rubber pads are used instead of conventional steel springs. They are 152 cu. ft. in capacity, struck measure, and track gauge is 42".

Aside from a heavier draft gear to meet the requirements of steeper grades and heavier trains, today's cars are little changed from those in the original order. Four re-orders over a period of years prove customer satisfaction at International Minerals & Chemical Corp.

You, too, can customize your haulage with an economical CARD design. Our engineers can furnish an efficient car to meet your most difficult specifications.



C.S. Card Iron Works Co.

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electric potential, vast undeveloped resources of iron ore, and sizable reserves of manganese, nickel, and phosphates.

The present government, under President Cafe Filho, is apparently opposed to nationalization and favoritism and is ready to live up to the new decrees which favor private foreign investment. United States investors, however, want protection against possible unfair treatment or the threat of confiscation that may occur with a change in government. This risk would be reduced if at least half of the capital for a mine project was provided by a loan from the Export-Import Bank, the World Bank, or the International Finance Corporation.

The United States Department of Commerce, Office of Business Economics, supplied the data shown in accompanying table for United States capital invested in all industries in Brazil and Peru, compared with the totals for all Latin-American Republics.

During the four years 1950 to 1953 there was a 20 percent increase in new United States capital investments in Brazil while there was a 45 percent increase in that of Peru. This increase is believed to be largely a result of the new mining code and tax reductions established in 1950 which favor investment in mines.

Citizens of the United States who contemplate investing in a mining venture in Latin America should not overlook the possible application of United States taxes to the profits of the enterprise. Dividends paid by the enterprise will be taxable to United States citizens regardless of where they may reside. For this reason the United States investor may want to consider contributing part of the initial investment for stock and part for the companies' promissory notes. If the ratio of loans to stock is kept at a reasonable level, the subsequent repayment of the loans out of profits should not be treated as a dividend and therefore should not be taxable.

Brazil is now faced with a reduction in output of coffee and a corresponding decrease in income from coffee exports; and about \$20,000,000 foreign exchange a month is needed to meet payments for imports of petroleum products. This situation may be relieved during the next few years by building up the yield of minerals and metals for export from numerous undeveloped mineral deposits. However, a readjustment of government controls and taxes as exemplified by Peru in 1950 may be necessary to induce foreign capital and technicians to cooperate with the local mine owners and financial interests.



AERIAL SURVEYING was described by Aero Service Corporation's E. E. Dando, Thomas Oftelie, W. B. Agocs, and A. O. Quinn. LABRADOR STORY of the Iron Ore Company of



Canada was told by C. E. McManus, gen. mgr., Hollinger-Hanna, Ltd. KOEPE HOISTING, how it works, was outlined by Eric Malmow, ASEA, New York, and E. P. Pfeider, U. of Minn.



DRILLING was the subject of papers by Leslie Dick, Earl M. Holmes, and James Warner. All are with the Oliver Iron Mining Division. William T. Henderson spoke on structural drilling. Arne Audelin, underground superintendent of Mather Mines,



Cleveland-Cliffs, reported success in rotary drilling. SCRUBBING of low-grade ores was described by R. H. Chisholm, pictured at far right, who is in charge of mineral development for Pacific Isle Mining Company.

Drilling, Scrubbing, Hoisting Highlight Minnesota Meetings

The twenty-eighth annual meeting of the American Institute of Mining and Metallurgical Engineers, Minnesota Section, was held in Duluth, Minnesota, on Monday, January 10, 1955. As is the usual practice, this was followed by a two-day annual Mining Symposium presented by the University of Minnesota's extension service. Attendance at all of the meetings equalled or exceeded records set in previous years.

Why Furnaces Need High Grade

The technical program was provided by speakers covering a wide variety of subjects. Charles D. Smith, assistant superintendent of Jones & Laughlin Steel Corporation, presented a paper entitled "Blast Furnace Practice." He outlined the history of blast furnace operation and presented some details on the design of blast furnaces and on their operation. The audience was particularly interested in information regarding the effect of variations

in the physical properties and chemical compositions of the feed to the blast furnace. Mr. Smith indicated that in some experimental work the reduction of ore to a top size of $\frac{1}{8}$ inch increased production and decreased coke consumption. Information was presented that indicated that a one percent increase in the silica content of the ore in the blast furnace charge can increase the pig cost as much as \$0.50 per ton. Emphasis was placed on the necessity of a uniform feed of constant chemical and physical properties within narrow limits. Variations from this uniformity result in difficult blast furnace operation.

Labrador's Growing Importance

Clare E. McManus, general manager, Hollinger-Hanna, Ltd., gave the final technical discussion of the day. His presentation, entitled "Labrador Operations," consisted chiefly of movies and slides illustrating the development and operation of Hollinger-

Hanna iron ore properties in Labrador. Extreme difficulties in both weather and terrain were encountered in pushing this job through so that ore could be shipped during the past season. First ore was loaded in July 1955 and the last shipload left the dock at Seven Islands on December 5. (See MINING WORLD report in September 1954 issue.) Production for 1955 has been set at 7,000,000 tons.

Mining Symposium Speakers

The first session of the Annual Mining Symposium was held on Tuesday, January 11. "Friction Drive Mine Hoists" was the subject discussed by E. P. Pfeider, head of the department of Mineral Engineering of the University of Minnesota, and Dr. Eric Malmow, president, Aros Electric Company, New York, and electrical engineer for ASEA, Vasteras, Sweden. Professor Pfeider presented a history of the Koepe hoist and discussed some of the principles of the system. A



SESSION CHAIRMEN for the U. of Minnesota's Mining Symposium and the Minnesota Section of the AIME were from left to right: M. E. Volin, regional director, U.S.B.M., Minneapolis; Hugh J. Leach, manager Minnesota mines, Cleveland-Cliffs Iron Company; L. J. Severson, vice president, Oliver Iron Mining Division; and H. L. Kullberg, Minnesota manager, J&L Steel Corporation.



STABILIZATION OF OPEN-PIT BANKS is discussed by Robert Buck, chief engineer, M. A. Hanna Company; T. L. Joseph, professor of metallurgy, University of Minnesota; and V. A. Hewitt, mining engineer, M. A. Hanna Company. At far right is Herbert Hill, chief engineer, Northern States Power Company.

good deal of interest was shown in the description of the installation being made by Cleveland-Cliffs Iron Company at its Cliffs shaft mine in Ishpeming, Michigan.

The second paper was presented by Arnie Audelin, underground superintendent at the Mather Mines for Cleveland-Cliffs Iron Company. He discussed the use of rotary drilling methods in Lake Superior district iron mining. At the Mather mines 12% horsepower rotary drills are now in use. Auger rods in 3-foot sections, 2 and 2½ inches in diameter are used. Types of bits, including solid head, chipper, and adjustable, were described. Advantages of this type of drilling include lower initial cost, faster cutting, less rod breakage, faster changes, and dry drilling resulting in better working conditions. Disadvantages include higher maintenance on the drilling machine, greater air consumption, non-reversibility of present machines, and bit wear is high on hard ores.

Aerial Surveying Panel

The first afternoon session consisted of a panel discussion entitled "The Application of Aerial Surveys to Mining Engineering." Panel members were: E. E. Dando, moderator; Thom-

as Oftelie, William B. Agoes, and A. O. Quinn, all with the Aero Service Corporation, Philadelphia, Pennsylvania. Mr. Dando set up a hypothetical problem involving a mining company desiring to have a certain area surveyed. Mr. Oftelie discussed the application of aerial photographs to this problem. He went into detail on the quality of the photograph to be expected along with the size and scale. Dr. Agoes discussed magnetometer surveys as well as radioactive and radiomagnetic surveys. He described the method used in obtaining the necessary data in the field; the type of equipment used; and costs. He also reviewed some of the points connected with electromagnetic surveys; how they are used and how obtained. Mr. Quinn went into the evaluation of the data obtained in the field and how it can be used by the mining company. He described, with the use of slides, the type of laboratory equipment used and the possible applications to development of the property including roads, railroads, campsites, tailings ponds, water supplies, etc.

Why and How to Scrub

In the absence of John D. Boentje, general manager of Pacific Isle Mining Company, R. H. Chisholm, of the

same company, presented his paper entitled "The Use of Scrubbers on the Mesabi Range."

It was pointed out that scrubbing can be accomplished by jet impacting, screening, stirring, or tumbling. Revolving screens were the first type of scrubbers used on the Mesabi but these have generally been replaced by vibrating screens. In subsequent years the log washer found considerable applications. There are still a considerable number of these units in operation. In washing plants the primary purpose is the disintegration of fine, high moisture content material so that it can be separated from the coarser material. The second purpose is to remove a high percentage of fine material to prevent it from contaminating the media circuit in heavy media plants.

It was indicated that the use of scrubbers could result in a considerable improvement in the grade of the concentrate being produced by a plant and the percentage of iron in the tailings lowered. Recent installations have been made to clean up the feed ahead of heavy media separation at the Carlz, North Uno, Virginia, and Coons-Pacific mills. In 1953 a drum-type scrubber was installed at the Schley mine to gain an improvement in washing action. No heavy media plant is involved.

William Olinger, general manager, The Gilbert Corporation, Gilbert, Minnesota, presented a discussion on the practical application of electro-osmosis to stabilization of soil banks. He outlined the history of this development and the physical principles involved. He reviewed in detail, using slides, two applications used by his organization. One was at a mine near Hibbing, Minnesota. Use of electro-osmosis made it possible to work with much steeper banks with assurance of stability.

William T. Henderson, mining engineer for the Pioneer Mining Company, Biwabik, Minnesota, presented a paper entitled "A Recent Development in Structure Drilling." This is a new drilling method developed by Frank Bergstrom, vice-president of Pioneer, which uses air in place of water. It is claimed that the resultant sample can be examined with greater accuracy in the laboratory, since soluble materials have not been leached from it. Large size particles can also be obtained. Cost of drilling as compared with normal methods of obtaining structure samples is said to be much lower.



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How Low-Head Gismo and Special Cars Will Speed Drifting Cycle

A new type of low-head Gismo, hard rock, self-loading ore transport, together with drilling jumbo, has been developed to operate in a development heading. The original Gismo (see MINING WORLD, January 1953, page 39) was designed expressly to operate in stopes in thick ore bodies with low dips.

This new type Gismo which is the logical development from the original one has also been perfected by Dale I. Hayes, western manager, American Zinc, Lead and Smelting Company. It, too, will be first used at the Grandview mine at Metaline Falls, Washington. It is a low-head unit designed to operate in an 11- by 11-foot tracked development heading, in contrast to the stoping Gismo which is used for trackless mining.

In addition to the new Gismo, a string of specially designed and constructed bottom dump cars will be used in the heading. Initially 16 of these specially designed cars have been built by Sanford-Day Iron Works which also has the manufacturing and sales rights for the Gismo. Each car has three compartments, with bottom dump, and holds six tons. They are low-head type but have a wide track gauge. Gauge is slightly wider than the gauge of the Gismo and its motivating Allis-Chalmers Diesel tractor. However, each



GISMO loading broken rock in above-surface demonstration. This is way the loading unit will be pushed into development heading by the Allis-Chalmers Diesel tractor.

car is equipped with a special steel shelf or flat track about 12 inches wide with a 2-inch-high lip alongside the full length of the car.

Here's how the cars and new Gismo will operate in a development heading. The track will be carried a minimum of 15 feet and a maximum of 55 feet from the face. This means that track will only be extended when a 40-foot length of rail can be added. The Gismo will advance into the heading cleaning up fly rock ahead of it. Behind

the Gismo will be a string of cars, the number being enough to hold all the muck broken in the round. Ahead of the cars and mounted on wheels will be a three section ramp. The heading end of the ramp can be raised or lowered to form an incline leading from the bottom of the heading to the top of the ramp. Complete unit will be pushed in to face by a mine locomotive.

The Gismo will load in the face, back up the inclined ramp, travel over the cars along the special track on the side of each car, and dump its load of broken rock into the empty car. It will be remembered that the original Gismo had a bottom dump and discharged into ore pass raises at the Grandview. The car farthest from the face will be loaded first and then successive cars until the round has been mucked out. The empty Gismo will then be driven up the ramp, the inclined section raised, and a mine locomotive will then pull the string of loaded cars, together with the ramp and the Gismo, out of the heading. At the first switch, the ramp with the riding Gismo will be uncoupled from the loaded cars which will be hauled to and dumped at the skip pocket. Meanwhile, the drilling section of the Gismo with booms and long feed machines will be added. The Gismo will either go back into the heading under its own power or can be backed into heading riding the ramp with a locomotive. Once at the face the regular drilling and blasting cycle will be started.

This new equipment will speed development because it is anticipated that a 10-foot round in an 11- by 11-foot heading can be mucked out in about 45 minutes. Other advantages are the elimination of California switches, cherry pickers, car transfers, and switching tracks. Also simplified will be the tramping of loaded and empty cars and the delays in loader operation waiting for empties.

The first new Gismo, loading ramp, and string of cars have been completed and a special above-surface test run and demonstration using three cars was held in November at American Zinc's North Friends Station mine in Tennessee.

Electric Safety With Radio

The Lake Mining Company (Pickands Mather & Co., operating agent) is using walkie talkie radios at its Embarrass open pit iron mine in Minnesota to provide two-way communication between electricians doing remote switching operations, trouble shooting, or repair work. While time is saved in case of trouble the greatest value is that of safety. Sequential switching can be done regardless of time of day, and with no distance or sight limitations. Using radio communications the electricians talk directly with one another and know which switch is thrown at a distant power source, and if lines are safe to work on.

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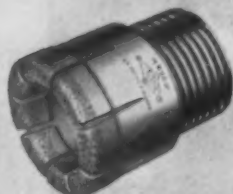
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BLAST HOLE BIT



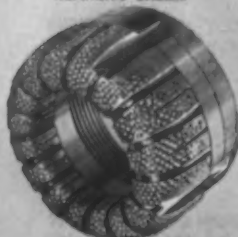
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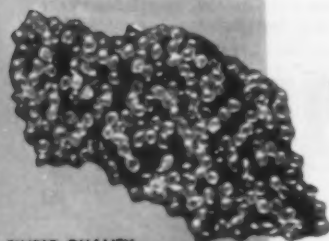
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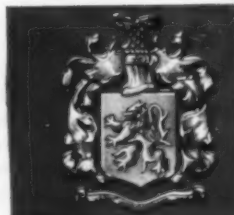
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United States

Personalities in the News

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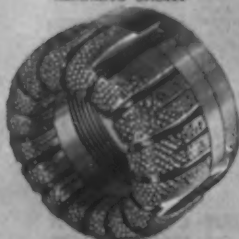
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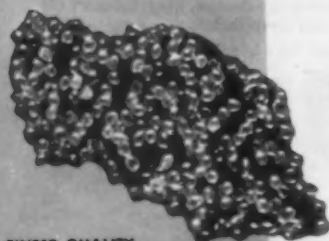
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Dudley L. Davis, formerly a resident geologist and engineer for Anaconda Copper Mining Company, has been appointed assistant chief of the U. S. Atomic Energy Commission's Salt Lake City, Utah exploration branch.

Milton R. Sermon, Oliver Iron Mining Division of United States Steel Corporation, was named chief mining engineer of the Hibbing-Chisholm District, succeeding W. P. Wolff. Since 1952 Mr. Sermon has been assistant chief mining engineer.

At Kennecott Copper Corporation's Utah Copper Division J. C. Landenberger, Jr. was promoted to general superintendent of operations; V. S. Barlow succeeds him as general super-

intendent of mines; Ernest C. Simkins was named superintendent of mines; J. A. Norden, general mine foreman, was named assistant mine superintendent. Replacing Mr. Norden as director of labor relations is Duane O. Olsen. At the Deep Ruth Mine of the firm's Nevada Mines Division R. Clair Nispel was named mine superintendent, and George E. Jennings was appointed general foreman.

Delwin Blue, formerly assistant chief of the light metals branch, U. S. Bureau of Mines minerals division, has assumed his new position as head of the Boulder City, Nevada Bureau of Mines station. He succeeds Frank S. Wurtman, who has joined the staff of Cramet, Inc., Tennessee titanium producer.

OTTO HERRES, (right) vice president of the Combined Metals Reduction Company, Salt Lake City, was named president of the Utah Mining Association for 1955. Mr. Herres served as first vice president during 1954. Elected with him for the coming year are L. F.



PETTY, general manager of Kennecott Copper Corporation's Utah division, first vice president, and CLARK L. WILSON, vice president and manager of operations for New Park Mining Company, second vice president. MILES P. ROMNEY was reelected secretary-manager of the organization.

Chester D. Tripp, president of Consolidated Coppermines, Kimberly, Nevada, presented watches to seven employees who had 25 years or more service with the company at a special dinner in November. Employees receiving watches were: John Eaby, chief clerk; A. J. Proctor, churn drill foreman; F. J. Tong, churn driller and welder; V. D. Hall, accountant; A. J. O'Connor, vice president and general manager; Thomas Gilmour, master mechanic; and Miner W. Shields, chief electrician.

A group of Colorado School of Mines graduates have formed a new engineering and geological service organization, Technical Services, Inc., with headquarters in Grand Junction, Colorado. President of the group is Burt E. Hartmann. Other members of the organization are R. A. Hildebrand, Robert Hurst, and R. T. Brown, Jr.

Several recent appointments in the Idaho bureau of mines and geology has brought the group up to its full complement of staff members. Lewis S. Prater, bureau metallurgist, was given the additional duty of assistant director. Harold A. Powers, Missouri, was named bureau geologist. Appointed chemist-analyst was Charles R. Kurtak, who has been with the bureau for several years.

Stuart A. Falconer was named chief metallurgist of the mineral dressing department of American Cyanamid Company to fill the vacancy caused by the recent death of S. J. Swainson.

Coleman Harcourt, Nevada mining man, is the new superintendent of the Linka tungsten property of Consolidated Uranium Mines, Inc. Construction of a mill at the property, in Nevada's Smokey Valley, is nearly completed.

Sheldon P. Wimpfen, manager of the Grand Junction Operations Office of the U. S. Atomic Energy Commission, has been named the "outstanding ex-student for 1954" by Texas Western College of the University of Texas, El Paso, Texas.

D. T. Wellmann, president of the Wellmann Bronze and Aluminum Company, was elected president of the Magnesium Association at the group's tenth annual convention in St. Louis, Missouri. James E. Pepall, Montreal, Canada, was elected vice president, and J. V. Coseman, Brooklyn, New York, was re-elected treasurer. Speakers at the convention included A. J. Bell, chief project engineer of the applied physics laboratory, Johns Hopkins University, and Frank Nichols, president of Nichols Wire and Aluminum Company.



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DIFFERENTIAL STEEL CAR COMPANY

FINDLAY, OHIO

SINCE 1915 — PIONEERS IN HAULAGE EQUIPMENT

Newsmakers

in International Mining

J. W. Foote will assume the position of general superintendent for Mount Isa Mines Limited, Mount Isa, Australia, March 1. He has been assistant general manager of operations for Zinc Corporation Limited and New Broken Hill Consolidated Limited, also in Australia.

Norman Cleaveland, president of Pacific Tin Consolidated Corporation, was a visitor in San Francisco, California during January. His firm holds tin properties in Malaya with mine offices in Kuala Lumpur, Malaya and New York City.

Marcus D. Banghart, vice president in charge of operations for Newmount Mining Corporation in New York City, left early in January for South Africa. While in Africa he is visiting operations of Tsameb Corporation, Ltd., and O'Okiep Copper Company, Ltd., subsidiaries of Newmount.

Karel Wegkamp, MINING WORLD District Manager in Chicago, Illinois and well-known authority on iron ore and taconite mining and beneficiation, has resigned to accept a position with the Harry L. Peace organization in the southern United States. He will make his headquarters in New Orleans, Louisiana. Mr. Wegkamp, on a special assignment to cover the operations of A/S Sydvaranger, Norwegian taconite producer, in 1953, toured many mining operations in Scandinavia and other European countries.

Frank Eichelberger, consulting engineer, Spokane, Washington; **Ray Sullivan**, president and general manager of Minerals Engineering Company, Grand Junction, Colorado; and **John E. Byrne**, Byrne Construction Company, Washington, D.C. are inspecting tungsten, lead, chrome, and molybdenum mines in Portugal, Spain, and Turkey.

H. R. Cooke, Jr., who was formerly with the Northern Peru Mining & Smelting Company in Lima, Peru, has accepted a position as geologist with Martin, Sykes, Woods & Associates in Caracas, Venezuela. Mr. Cooke, an authority on sulphur mining in the Andes, was the author of "How High Can Mining Go", which appeared in the August 1954 issue of MINING WORLD.

Mort D. Turner, who has been carrying on a program of clay investigations in California for the state division of mines, was selected by the government of Puerto Rico to become

J. H. Vose, Jr., O'Okiep Copper Company, Ltd., has been named assistant manager of the Union of South Africa copper operation. A graduate of the Colorado School of the Mines in Golden, Colorado, Mr. Vose has worked in South Africa for O'Okiep for several years, serving as smelter superintendent prior to his recent appointment.



chief geologist for that country's geological survey.

Arthur F. Betchart assumed the position of chief engineer for American Metal Company, New Brunswick, Canada, December 1. Amco is developing a new base metal operation of the Little River near Newcastle and will soon begin construction of a concentrator plant there. Mr. Betchart was formerly with Pend Oreille Mine & Metals Company at Metaline Falls, Washington.

E. Balliol Scott, editor of The Mining Journal, British technical publication, retired after more than 53 years in that position. A recognized authority on mining economics, Mr. Scott has written extensively on safety and health conditions affecting mines throughout the world. Named joint editors to succeed Mr. Scott were **R. Bruce Dunfield** and **Ursel Balliol Scott**, a son of the retiring editor.



Recent visitors to the United States were **H. J. SCHUILING** (left), chief geologist and director of Union Miniere du Haut Katanga, Belgian Congo copper producing firm, and **PAUL DUHOUX** (right), chief of exploration for GEOMINES, tin mining company in the Congo. The two men made their trip to study airborne methods of exploration both in the United States and Canada. While touring the Iron Ranges, they attended the recent Drilling Symposium at the University of Minnesota and visited various photo-geological departments of American firms, including the E. J. Longyear Company in Minneapolis, Minnesota.

Walter A. Smith, mining engineer, is now in charge of tungsten exploration at the San Alberto mine, San Luis Mining Company, 40 miles north of Alamos, Sonora, Mexico. Prior to this assignment Mr. Smith supervised fluorspar exploration operations for the company at Esqueda, Sonora.

Nestorio N. Lim, mining engineer and geologist, has been appointed head of the mining and engineering department of the Adamson University, Philippine Islands. In the past Mr. Lim has been mining and valuation engineer, chief of the mining and metallurgical division, and acting director of mines for the bureau of mines.

A recent Asian mineral resources conference which was attended by fifty mining experts and senior government officials from 14 Asian and non-Asian countries was held in Bangkok, Thailand. **Pathom Gajasen**, Thai-

During December United States Senator **GEORGE A. MALONE**, then chairman of the Strategic Materials subcommittee, made a tour of the Cuban mining industry. His visit included an inspection of the Nicaro Nickel Company, which operates the World War II U. S.



built nickel mines. Mining officials in Cuba expressed a desire for increased purchase of Cuban minerals by the United States, pointing out the strategic importance of the island due to its geographic proximity to the U. S.

land, was elected chairman of the conference, and **G. F. Gripper**, Malaya, vice chairman. Under the sponsorship of the United Nations Economic Commission for Asia and the Far East, the conference was attended by representatives from Australia, Burma, China, France, India, Indonesia, Japan, Republic of Korea, Malaya, British Borneo, Philippine Islands, Thailand, United Kingdom, United States and the USSR.

Lloyd M. Pidgeon, head of the department of metallurgical engineering at the University of Toronto, is the recipient of the first Ambrose Monell Medal for distinguished achievement in mineral technology. The award was presented by Columbia University, in honor of the first president of International Nickel Company for whom the copper-nickel alloy, monel, was named. Dr. Pidgeon is a well-known metallurgist and is discoverer of the "Pidgeon Process" for production of metallic magnesium.

Niels J. Hornum, pioneer mining consultant in Turkey and Alaska, recently completed an assignment for the World Mining Consultants, New York City, to locate fresh water for Turkish cities. The project was under the auspices of the Foreign Operations Administration. After returning to the United States Mr. Hornum made a brief trip to Alaska where he was an early day prospector and driller. He expects to return to the Territory in the spring for a possible drilling program.

Harno Kahma, geological survey of Finland, has been visiting mining districts in the United States and Canada.

H. H. Merritt, mining engineer, is now with Williamson Diamonds Limited, Mwadiu, Tanganyika.

Mohamed Damih Alla, geologist for the Egyptian Department of Mines, is on a six-month tour of the Federation of Rhodesia and Nyasaland. His visit, at the invitation of the Southern Rhodesia government, includes trips to the Selukwe chrome mines, asbestos operations at Shabani, and Northern Rhodesian gold, copper, and zinc mines.

Alexander G. Sheremetyev has been appointed minister of ferrous metallurgy of the Soviet Union. He succeeds the late **A. N. Kuzmin**.

Koepe Hoists

(Continued from page 51)

eventually runs into a wedging action of the guides if the overwinding continues. Safety catches fixed to the headgear are used to prevent the conveyance falling after an overwind.

Figure No. 3, diagram (a), shows one of the arrangements adapted for loading and unloading cages. Chairs or keps are inadmissible because they could cause rope slippage; likewise, bearers at the bottom of the shaft. Both cages must be freely suspended. Hinged flaps are used, across which the cars can be run on to the cage decks. The decks of the top cage are usually correctly placed. Figure No. 3, diagram (b), shows a proposal made in Holland whereby the decks of the bottom cage can be forced down by the flaps when operated by the power cylinders shown. The cars can then be run through more or less on the level.

When first installed ropes stretch and become longer in the course of time because of the load suspended from them. Various methods are used for adjusting the height of the conveyance relative to the rope to correct for this and some examples are shown in Figure Nos. 4 and 5. All such devices require that adequate room be left for them in the height of the headgear after due allowance has been made for the overwind distance.

Type And Size of Ropes

Of shaft equipment the most important item is, of course, the rope. On the Continent, ropes have hitherto been almost universally of stranded construction, no other kind having been generally known. Also, it has been maintained that the friction effect is enhanced by the biting of the strands into the Koepe wheel tread. Recent tests, however, have shown that the locked-coil type of rope offers considerable resistance to slip and there is at least one shaft now hoisting regularly with such a rope.

Balance ropes may be of round or flat construction. Flat ropes are allowed to hang freely in the shaft and sump without a bottom pulley, but

glides or rubbing baulks are sometimes used at a short distance from the bottom loop. To avoid the awkward run of the rope at the loop, which occurs with round balance ropes if twist is present, an attachment to the cage incorporating a swivel is used. The balance rope is a completely different rope from the suspension rope. The clamps for fixing balance ropes are usually of the same pattern as those used for the suspension ropes.

The largest diameter of rope that can be manufactured with any success in Europe is a rope of about 2½-inch diameter. At Hanover, Germany, they wished to hoist a very heavy load which would have required a rope of much more than 2½-inch diameter. Accordingly, they decided to try driving four ropes of smaller diameter with one much smaller Koepe wheel, these four ropes all sharing the weight of the conveyance and load. With a view to making the ropes share the load equally, each rope is suspended with a device similar to that shown in Figure No. 5B where the distance of the rope suspension point from the cage suspension point is adjusted by moving the pegs down. To ensure that the ropes are sharing the load properly, a C-ring in compression is incorporated in the column of pegs and a frequent check is made on the size of the gap in the C-ring. Any adjustments found necessary are made by moving the pegs so that the ropes again share the load.

Wheels And Rope Treads

Various types of construction have been used for Koepe wheels, but modern wheels, including those now being built in England, are of welded steel construction.

Rope treads on Koepe wheels are sometimes made of wood throughout; in such event they are usually made wide enough to have three grooves cut in them, the grooves being used, in turn, as each successive groove wears out. In most of the treads at present under construction in England, these laminations will be of

"Ferodo". There is, however, a move on to experiment with plastic materials. Figure No. 6 shows a Dutch arrangement where the laminations are of two different kinds of leather. Old conveyor belting has sometimes been used. Aluminum treads have also been tried, but these distribute aluminum dust and chippings all over the hoist house. This is liable to cause damage to the electrical apparatus.

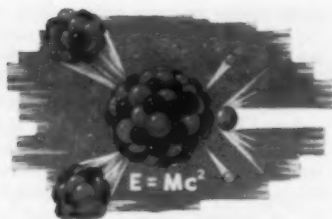
Rope changing is a feature of Koepe winders that needs careful consideration. The processes are usually lengthy and involved and programs have to be carefully worked out beforehand. As already indicated, Koepe hoists with separate rope-changing winches are more common than the magazine type. It should be remembered that balance ropes have to be changed, as well as the main ropes. It is understood that the four ropes of the winder at Hanover can be changed in 24 hours. Rope-changing methods vary and there is not space here to describe any particular one in detail.

Induction Motor Drives

BTH is supplying induction-motor-driven hoists for a colliery in Scotland. Each of these will be twin rope, ground-mounted equipment with the headgear sheaves mounted one above the other. The rating of each equipment is 1,450 horsepower and bottom discharge skips will be used. These will have closed-loop control with the excitation for the main generator obtained from an amplidyne which is now being applied to induction motor hoists in such a way that the speed of the hoist can be made to correspond to the position of the driver's lever, as with Ward-Leonard control. The induction-motor-driven hoist can be more economical than the Ward-Leonard hoist because there are no motor generator set losses during idle periods. Also the first cost is less. Moreover, the closed-loop control is a development which is also essentially suitable for automatic hoisting. Hence, many new friction hoists in England will be driven by induction motors and will also have automatic control.

Specifications of Typical Koepe Hoist Installations

Company	Sandvikens Stockholm	Luossavaara- Kiirunavaara	Stallbergs Grut A.B.	The Cleveland-Cliffs Iron Company	West Driefontein Gold Mining Co. Ltd.	Falconbridge Nickel Mines, Ltd.
MINE	Bodas	—	—	Cliffs Shaft	West Driefontein Shaft	No. 1 Fecunis
LOCATION	Sweden	Sweden	Sweden	Isipeming, Mich.	Union of S. Africa	Ontario, Canada
TYPE OF HOIST	skip-cage	1-skip	2-skips	1-skip	1-skip	2-skips
TOTAL WEIGHT OF LOAD	35,934 lbs	47,350 lbs	30,390 lbs	30,000 lbs	240,000 lbs	17,000 lbs
WEIGHT OF COUNTERWEIGHT	19,900 lbs	21,000 lbs	skips in balance	35,000 lbs	—	skips in balance
MOTOR HORSEPOWER	135	410	500	1,500	2-2,000	1,500
WINDING DISTANCE	1,900 ft.	1,510 ft.	3,940 ft.	3,940 ft.	5,460 ft.	4,200 ft.
HOISTING SPEED	985 ft./min.	985 ft./min.	1,970 ft./min.	2,000 ft./min.	3,000 ft./min.	2,200 ft./min.
NUMBER OF ROPES	2	4	1	4	4	4
DIAMETER OF ROPES	1.26 ins.	1.06 ins.	1.652 ins.	1.125 ins.	—	1.25 ins.
DIAMETER OF DRUM	10.5 ft.	7.88 ft.	13.14 ft.	9.833 ft.	17.5 ft.	9.833 ft.
NUMBER OF STATIONS	3	8	—	2	—	2
MANNER OF OPERATION	push button	push button	manual	push button	push button and manual	push button



FISSION FACTS

Monthly Roundup of Mining News
In the Atomic Energy Field

AEC's Yearly Report Sees 1,000 U₃O₈ Shippers in '55

Ore from an estimated 1,000 claims will be shipped to United States Atomic Energy Commission receiving stations in 1955. In a report reviewing uranium industry activities for 1954 Sheldon P. Wimpfen, manager of the Raw Materials Operations Office for the AEC at Grand Junction, Colorado, said that production in 1954 continued to follow the trend of doubling every 18 months. However, tons produced during the first half of 1954 exceeded the total output for the entire year of 1952.

Bonus payments to uranium miners from March 1951 to December 1954 totaled \$4,377,173. During 1954 alone \$1,800,000 was paid out in bonuses. Seventy-eight properties have received the full benefits, totaling \$35,000 each.

Other highlights of the AEC report were the following:

1. An estimated 4,000 persons were working in United States uranium mines during 1954.

2. With seven mill expansions for the Colorado Plateau concentrators announced during 1954, mill capacity is expected to increase even more this year. Negotiations for a mill at Moab are continuing, and the commission is studying several other mill proposals.

3. Private industry drilled 2,500,000 feet of hole in exploration for uranium during 1954. The AEC sank 400,000 feet of drill hole, and the U.S. Geological Survey drilled 500,000 feet.

Argentine Uranium Occurs In Several Provinces

Discovery of uranium in Argentina dates only from 1948. To date deposits have been found in Cordoba, San Luis, Catamarca, La Rioja, and Mendoza provinces.

Two of the most important uranium mines are the Soberania in Mendoza where veins assaying to 1.84 percent U₃O₈ have widths from 0.10 to 1.50 meters, and the San Santiago in La Rioja province where pitchblende has been found. Other smaller deposits have been found in many pegmatites.

British Survey Reports On Uranium Reserves

The Geological Survey of Great Britain has published its 1953 report in which it is stated that the largest uranium reserves in the country are found in Devon and Cornwall. However, they are too small to warrant the erection of a concentrating mill estimated to cost £250,000. Efforts are continuing toward the discovery of a significant ore body.

Exploration by 5,000 feet of diamond drilling was carried out at the abandoned Terras mine near St. Austell which was formerly worked for uranium. High values were found in the country rock but no extension of the ore shoot or discovery of an unknown one was made.

Radioactive minerals occur in a large number of places in Cornwall and many years ago considerable tonnages of torbenite were sold for the copper content.

Investigations were also carried out at Wheal Edward near the Land's End and in other mines in the locality.

The dumps from Wheal Edward, formerly worked for copper, have been worked over at least on two occasions for uranium or radium. However, it is reported that a small syndicate may reopen the mine again.

The Geological Survey also located a new discovery of uranium at Wheal Bray on Bodmin Moor but apparently it does not warrant further development.

Oil Companies Wildcat Uranium

The entrance of oil companies into the domestic uranium field is one of the outstanding characteristics of the United States atomic energy picture.

Kerr-McGee Oil Industries, Inc., recently opened its \$3,000,000 uranium processing mill at Shiprock, New Mexico. The Texas Company, one of the nation's largest oil producers, has announced a joint uranium exploration program with New Jersey Zinc Company. Hunt Oil Company, actively drilling on several Utah and Colorado leases, is already shipping from its mine in the Seven Mile district, Grand County, Utah. And countless other oil producers, large and small, are turning their sights to the Colorado Plateau for a new kind of wildcatting. With the trend of oil into uranium continuing and as the list of once exclusively-oil firms adding the word uranium to their names grows, it might be well to look into the reasons for this development.

PROFIT POTENTIAL has obviously encouraged the companies to enter the uranium field. Although every miner has not become a Charles Steen or a Vernon Pick, government prices and bonuses are generous enough to encourage any company with capital to invest. The fact that oil companies have adequate venture capital to conduct exploratory work in uranium has been an important factor.

OIL FIRMS ARE EXPLORATION MINDED. They are used to wildcatting, which is fundamentally what they are doing on the Colorado Plateau. Oil independents by the score have set up consulting offices and uranium companies to begin exploration work. Like Dallas, Texas oilman William J. Cary, who just opened a district office in Grand Junction, Colorado, they are looking for "properties of merit" that justify evaluation and development.

TRAINED GEOLOGISTS AND ENGINEERS, many with mining degrees, are employed in large numbers by the oil companies. These include some of the best and most experienced sedimentary geologists in the na-

tion, a significant fact since all of the uranium discoveries on the Plateau, with the exception of the Marysvale, Utah area, have been found in sedimentary rock.

ESSENTIALLY ENERGY SUPPLIERS, oil companies want to get in on the ground floor as uranium is forecast as the energy source of the future. Thus, Bolack Oil and Gas Company of Farmington, New Mexico is found assigning exploration work for uranium ore on 52,000 acres of land held by the firm in the Grants-Gallup area of New Mexico. Similarly, Rosebud Oils, Inc. of Huron, South Dakota has reported purchase of 22 claims in the Moab mining district from Moab Uranium Company and is planning an immediate mining program on the property.

STATE AND FEDERAL LANDS have been the site of many uranium deposits. Although this has proved a legal stumbling block for many prospective uranium producers, oil companies have land men trained in securing mineral rights on these properties.

Although additional oil companies are announcing uranium plans every day, the following firms form a partial list of companies engaged in actual development work or uranium production by the end of January: American Duchess Uranium & Oil Company, Ross G. Baker, Black Thunder Oil Corporation, Bolack Oil and Gas Company, Byrd Petroleum Corporation, California Utah Petroleum and Uranium Company, William Clark, Comstock Uranium and Oil Company, English Oil Company, Fortune Uranium Oil and Exploration Company, Front Range Oil and Uranium Company, Gem Uranium and Oil Company, Hunt Oil Company, Kismet Oil and Uranium Company, Liberty Oil and Uranium Company, M.A.K. Makris, Panhandle Oil Corporation, Critchlow Parsons, Rushmore Uranium & Oil Company, Painted Desert Uranium and Oil Company, Rosebud Oils, Inc., Sapphire Petroleum Ltd. (Canadian), Southern Oil Corporation, Spokalta Petroleum.

Vulcan Mine

(Continued from page 55)

of development muck had been handled, from which have been recovered 1,400,000 ounces of silver, 3,900,000 pounds of lead, 1,200,000 pounds of copper (1.42 ounces silver, 1.98 percent lead, and 0.61 percent copper per ton) and lesser amounts of antimony and gold.

Geology of These Deep Ores

Let us briefly examine the occurrence of these deep level ores. (See Plan Map of 3,000-foot-level workings.) First of all, mineralization is in rocks of the Revett formation as elsewhere in the Silver Belt. It is within a zone of intense hydrothermal alteration known as bleaching. Two quite distinct, but related types of mineralization are present and appear at this time to be controlled by a curving and branching of the main Galena fault zone. Immediately along the Galena fault, and in its south wall, there is an area of intense silicification cut by a number of veins trending roughly east-west and a number of veins trending roughly north-south. This, the lead zone of mineralization, consists primarily of quartz gangue, galena, minor amounts of tetrahedrite, sphalerite, and pyrite. There are literally hundreds of veins, ranging from a fraction of an inch to a number of feet in width. While the entire zone may be said to constitute low-grade ore, there are of course higher grade shoots within it, and it is most probable that these would be mined as a number of sep-

arate veins. Because of the general east-west strike of the zone and the curve previously referred to in the Galena fault system, the lead zone has an overall downward pitch at a relatively low angle to the east. It is of interest that individual veins impinge upward and eastward on the Galena fault-system where they break into a number of very tiny mineralized fractures, and westward and downward they appear, from the limited development yet done, to pass into barren quartz-siderite veins. Thus, there is formed a strong in echelon pattern such that the veins closest to the shaft on the 3,000 level pinch out as they are followed upward and are succeeded by veins further to the south and west. The lead zone is not completely developed.

Mineralization of the silver zone consists of a number of fairly discrete, but intricately branching, siderite veins with minor quartz gangue frozen to walls of altered quartzite and containing as metallic minerals, tetrahedrite, chalcopyrite, and pyrite. Only trace amounts of galena have been seen. The tetrahedrite is of the argentiferous variety, containing throughout the area which has been developed to date, a quite consistent average of approximately 20 ounces silver to the percent of copper. Development has been concentrated on one vein and we do not yet know the extent of silver mineralization.

Lead mineralization has been developed from the 3,000 level to the 2,400 level, in which zone we believe

there is one or more veins which will be minable, at least across a narrow width, within a substantial part of the developed length of 1,500 feet. The main silver vein has been partially developed between the 3,400 and 2,400 levels and for lengths ranging upward from 400 feet across a comfortable mining width. Because of the complexity of veining present, constant geologic control is necessary to discover and extract these ore bodies.

Cut And Fill Mining

That, then, is briefly the recent history of the Galena mine, but the job is by no means finished. In the first place the mine is not quite in production and until it is all the rest of this effort can be considered as the necessary preliminaries. It is planned to mine by a cut and fill method, using deslimed mill tailing taken down the Galena shaft for filling. This system is now being installed. Many parts of the Galena mine are in extremely silicified rock having a superincumbent load of 3,000 to 4,000 feet of rock. Considerable attention is being given to systematic extraction to obviate wherever possible bursting conditions which may be logically expected in these hard rocks at this depth. The mill is, in general, a standard flotation plant, designed to allow lead ore, silver ore, or both, to be mined and handled in the same fundamental circuit. Finally, when all seems to be running smoothly on a production basis at the Galena, there remains the fact that only a small portion of the area along the Galena fault has been reached by development work.

Why Project Successful

Reviewing then what may be the noteworthy features of the entire Galena deep level project: First, it was an old mine with a modest production record in a belt which the best available geologic talent believed to be very favorable for the occurrences of ore bodies of large size. Second, the cooperation from a business standpoint between a number of mining companies was achieved so that adequate and courageous venture capital could be supplied to what was a costly and difficult program. Third, we are proud to have had in our own organization men of such caliber that the very considerable difficulties of deep development in bad ground could be successfully surmounted. And fourth, when we got down to the 3,000 level, there was mineralization sufficient to justify all the faith and the effort of the eight long years that it was necessary to expend in order to bring the new Deep Galena mine into production.



ENLARGED MILL with a daily capacity of 350 tons. This mill treated all development muck which was economically justifiable and to end of October 1954 it had treated 98,000 tons. Addition is unpainted section at right.

ASARCO, Cerro de Pasco, Newmont, Phelps Dodge Combine To Develop Peruvian Copper Deposits

American Smelting and Refining Company has completed preliminary negotiations with Cerro de Pasco Corporation, Newmont Mining Corporation, and Phelps Dodge Corporation for the financing of the Toquepala copper project in Southern Peru. Under the arrangements the Toquepala property, together with the Quellaveco property of American Smelting and the Cuajone property owned by Cerro de Pasco and Newmont, also located in Southern Peru, will be transferred to a new corporation, Southern Peru Copper Corporation, in which American Smelting will own 57% percent of the capital stock, Cerro de Pasco will own 16 percent, Newmont will own 10% percent, and Phelps Dodge will own 16 percent.

The Southern Peru Copper Corporation has already entered into an agree-

ment with the Peruvian Government relating to the Toquepala project including provisions assuring stable income tax rates, waiver of import duties, freedom of exportation of copper, and freedom of exchange.

The Export-Import Bank of Washington, D.C. has also agreed in principle to extend credit to Southern Peru Copper in amount not to exceed \$100,000,000, plus capitalized interest during the construction and start-up period, for the purpose of developing and equipping the Toquepala property, provided private interests invest in the project not less than \$95,000,000, inclusive of the sums previously expended. This investment must be in a form satisfactory to the Bank and subordinate to the Bank's loan.

Drilling of the Toquepala property was completed in 1952, and an ore re-

serve in excess of 400,000,000 tons has been proven, with an average assay slightly greater than 1 percent copper.

The project includes preparation of the deposit for open-pit mining at the rate of 30,000 tons of ore per day, the construction of a concentrating mill, townsite and other facilities near the mine, the construction of a standard gauge railroad of approximately 110 miles to the mine from the sea coast at Ilo, Peru, the construction of a smelter, power plant and townsite on the sea coast near Ilo and the construction of port works, warehouses, and other facilities at Ilo. Above five years will be required for construction and the total investment will reach approximately \$200,000,000.

The Quellaveco and Cuajone properties also contain large porphyry-type copper deposits. Both have been drilled and their location is such that many of the major facilities for Toquepala can eventually serve these properties.

Korea To Build Tungsten Plant at Sang Dong Mine

The government mining bureau of the Republic of Korea plans to build a tungsten chemical plant at the Sang Dong mine operated by the Korea Tungsten Mining Company. Korean mining engineers have already been sent to the United States on two different occasions to seek a suitable process and to study plant construction projects.

According to reliable information, Korea has started negotiations with the United States Vanadium Company of New York regarding a license to adopt the rotary digesters for making synthetic scheelite for which the company holds patents, and with Utah Construction Company of San Francisco for an Engineering and Construction Supervision Agreement to build the plant. A Utah representative, James A. Mecia, reportedly is now in Korea to review the contract draft.

Korea Tungsten Mining Company has announced that it is suspending production for at least three months (January, February, and March) to rearrange its finances and to pursue its plan for upgrading and purifying scheelite concentrate. Actual suspension took place about nine months ago when the purchase contract with the United States Government terminated, although some production has been forthcoming off and on for the last six months to check recovery rates and to substantiate tungsten recovery from slime wastes.

Cuban Miners Seek U. S. Domestic Minerals Status

The Cuban National Federation of the Mining Industry has requested its government to suggest to the United States that Cuba be declared a "domestic area" as far as Cuban minerals are concerned. The federation pointed out that this is the status held by Mexico and Canada.

The executive committee of the federation held a special meeting to discuss the dropping of Cuban manganese from United States strategic stockpiling lists. Committee officials said this would result in the closing of Cuban manganese mine on January 1, 1955, at which time contracts will expire.

Calumet & Hecla Tries To Shorten Unwatering Period; Speed Up Osceola Production Date

Calumet & Hecla, Inc. recently took another momentous step in its gigantic program of unwatering the Osceola Lode at Calumet, Michigan when divers attempted to open a 12-inch valve located 1,800 feet below the surface and under 362 feet of water.

The valve is located in a pipe projecting through a concrete dam on the 28th level crosscut which connects the Osceola and Conglomerate lodes. The Conglomerate, in turn, is connected to the No. 5 Tamarack shaft. The dam was constructed in the late 1930's when the lodes were being abandoned.

In previous unwatering operations, the water has flowed from the Osceola to the Conglomerate through crosscuts on the upper levels, and then has been pumped through the No. 5 Tamarack. This method was used down to the 25th level crosscut where the water level remained at the time the diving operations took place. Opening of the valve would have permitted the 360 some feet of water (202,000,000 gallons) between the

25th and 28th levels to also be pumped through the No. 5 Tamarack. This would mean that the unwatering could be completed faster and would require less work installing pumps in the No. 13 shaft. See MINING WORLD, November 1954, pps. 38-45, for a detailed story of the unwatering of the Osceola.

Altogether five attempts were made to open the valve. One try was made by two diving firms from Chicago, Illinois, and four by personnel of a U.S. Navy experimental diving unit from Washington, D. C. Compressed air was used in the first three dives and a mixture of helium-oxygen for the last two. Using helium-oxygen creates less danger from "bends" allowing the divers to stay under greater depths for longer periods.

The time element was what prevented opening the valve. Even when using helium-oxygen U.S. Navy diving regulations would permit a man to stay under this depth of water (362 feet with a corresponding pressure of about 100



Divers try again to open valve under 362 feet of water

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pounds per square inch) for only approximately 30 minutes.

The general plan for all of the attempts was similar. After descending the inclined No. 13 shaft on a cage to the 25th level, two divers boarded a specially constructed car and were lowered to the 28th level. The car was constructed with a raised front end to protect the divers from floating debris and a platform on the tail end for the life lines; there were no sharp corners which could sever the life line or cut the divers. To give added weight to the car pig iron was added.

On being lowered to the 28th level, one of the divers was to walk along the drift toward the valve, a distance of 140 feet. His attendant remained in the car to watch his life line. The plan was to crack the valve and attach a specially constructed reel, so that the valve could be opened from the surface by pulling on a cable. If the valve were opened by the diver, it was feared he would be trapped by the sudden rush of water.

The attempt which came nearest to success was the final one on December 9th. U.S. Navy diver R. L. McKenzie had made his way 35 feet along the drift, but almost 25 of the allowable 30 minutes had elapsed and he was forced to return. He stated that debris made it difficult to walk and pull his life line.

Although failure to open the valve slowed down unwatering operations, it was only a temporary setback. Work began on December 16 to drive a crosscut from the 24th level of the No. 13 shaft to the Conglomerate Lode, a distance of about 750 feet. When completed a submersible pump would then remove the water between the 25th and 28th levels, pumping it through this new crosscut to the Conglomerate Lode. When the water recedes below the 28th level, the dam would be removed and the water pumped through this drift.

Though the diving operations were unsuccessful, it remains a tribute to the ingenuity, courage, and determination of the Calumet Division personnel as have the many other unusual phases in the unwatering of the Osceola Lode.

Canadian, German Firms In So. Rhodesian Chrome

Chromium Mining and Smelting Company, Ltd. of Canada has acquired the Umseswe Chrome Mines on the Great Dyke in Southern Rhodesia. The property consists of 51 base metal blocks of 30 claim areas each. The chrome mines were owned by Messrs. Rawstone & McCulloch and are an important producer of chrome concentrates. The production in 1953 amounted to 13,920 tons, and 9,653 tons during the first nine months in 1954. The entire production was absorbed by the Chromium Mining and Smelting Co. under a long term contract. The chrome ore from the mine is treated in a gravity concentrating mill, the final concentrates containing about 51 percent Cr_2O_3 with a chrome to iron ratio of 2.4:1.0.

Chromium Mining and Smelting is at present also negotiating the possibility of acquiring the Windsor Chrome Mines which are situated close to the Umseswe Chrome Mines. The Windsor mines are an important producer of high-grade, hard and lumpy ore containing over 50 percent Cr_2O_3 and a high chrome-to-iron ratio exceeding 3.4:1.0. Windsor mines produced 7,278 tons of

chrome ore in the first nine months in 1954. The claims consist of several hundred base metal blocks. Mining is being carried on to shallow depth in several mine sections. The chrome deposits are of the usual narrow chrome-seam type found in the Great Dyke.

The German Otto Wolf Group recently relinquished its option on the Windsor mines after a half year of investigation, when difficulties were experienced in transferring in time from Germany the bulk sum of the purchase price because of foreign exchange control. See MINING WORLD, December 1954, page 56, for the story of the Otto Wolf interest in the Windsor mines.

Otto Wolf is now investigating the holdings of the Kapata Tin Mines Ltd. near Kamativi in Southern Rhodesia. Several gold, copper, and lithium-mineral occurrences have also been investigated by the staff of the group which was flown out from Germany. The group has also carried out a complete investigation of its recently acquired Magwaza Chrome Mines eluvial claim holdings along the foothills of the Great Dyke where several millions of tons of high-grade, chrome-bearing soil have been blocked out.



EUROPE

NORWAY—A/S *Sydvaranger* has signed contracts with Great Britain and West Germany calling for the shipment of 700,000 tons of iron concentrate to these two countries during 1955. This is reported to be about 80 percent of the company's total annual production at Kirkenes and about the same amount as that exported in 1954. These mines are reported to have produced 1,800,000 tons of concentrate since April 1952 when production was resumed after post-war reconstruction.

AUSTRIA—The *Mitterberg* copper mine (Styria Province) raised its output 5.9 percent during the first half of 1954, as compared with the same period of last year. The *Brixlegg* mine (Tirol Province) boosted sales by about 25 percent during the same comparable periods.

CYPRUS—*Cyprus Sulphur and Copper Corporation, Ltd.*, a wholly owned subsidiary of the *Esperanza Copper & Sulphur Company, Ltd.*, shipped 14,150 tons of ore from the Kinoussa workings during the six-month period ended September 30, 1954. Shipments are continuing to meet contract obligations. At the Limni plant, the water supply is now satisfactorily settled. Installation of new pumps and piping is practically completed and operations on the Limni ore body have now started. The company reports that preparations are well ahead of future mill requirements. In the Enfilomeni section, the search for an ore body is still being continued. Four boreholes have been completed, all of which gave encouraging results. The No. 4 borehole passed through some 200 feet of sulphide ore, although with only traces of copper, gold, and zinc. Exploration by boring is being continued.

SWITZERLAND—Some molybdenum deposits in the Alps are currently under

investigation, and appear to be quite promising.

ENGLAND—In Derbyshire, exploration continues on the lead-zinc vein exposed in the new *Riber* mine near Matlock. This is a joint venture of *Johannesburg Consolidated Investment Trust* and *Derbyshire Stone Ltd.* who formed *Matlock Lead Mines* to operate the property. The *Masson* mine, located near the Riber and operated by *Derbyshire Stone Ltd.*, remains the largest single producer of metallurgical fluorspar in the country. Its treatment plant has been expanded during the past year. Some galena and barite are also recovered from the ore using a gravity plant consisting of jigs and tables supplemented by table flotation.

AUSTRIA—Utilization of mined iron ore, stored since the beginning of the 20th century at the magnetite mine near Turrach, is planned for the very near future. The ore allegedly is of 65 percent Fe_2O_3 composition, and 6 percent FeO . After using all available already mined ore, resumption of operations at the old 1905 mine is said to be under consideration.

CZECHOSLOVAKIA—Complaints are being aired in connection with Czech iron mining results; the *Spis* mine, for example (according to reports from Bratislava) failed to deliver 67,488 metric tons of iron ore, an amount which was earmarked for important tasks at the beginning of 1954, when the production plan was drawn up. The miners of *Gener* iron ore mine are 10,130 metric tons below the planned quota; only 58 percent of the September mining plan was fulfilled by the *Nizna-Slanska* mine, and the mine shafts of *Zelenznick* were 22 percent below the plan in September. The *Bana* mine reports fulfillment of only 65.5 percent of the target volume of iron ore during September. The explanation for the low production lies in the fluctuation of labor, the shortage of miners, and the absence of workers from the work site without excuses.

ENGLAND—Work on the £5,000,000 plant for production of sulphuric acid from anhydrite is now well advanced and the first unit is expected to go into operation next April. The plant is being built by the *United Sulphuric Acid Corporation* which was formed by 11 users of sulphuric acid following the sulphur shortage of 1951. These companies will buy the acid in agreed quotas for their own consumption. The major part of the equipment has been installed at the 66-acre site and permanent services such as power, steam, gas, compressed air, river water, and town water are nearing completion. Main contractor for the complete plant is *Simon-Carves* whose contract amounts to about £4,000,000. It has a license agreement with *Imperial Chemical Industries* to build plants of this type anywhere in the world. Collaborating with this firm is *Simon Handling Engineers*, responsible for materials handling and preparation equipment. Their share of the work amounts to more than £1,000,000.

NORWAY—Divers sent down by *Hovding Skipsopphugging* to attempt to recover mercury from the hold of a German blockade-running ship which went aground in 1940 were able to recover about 20 tons at a depth of 165 feet. This amounted to 527 flasks worth \$171,000.



KOREA—Korean tungsten has made its reappearance on the world market for the first time since the purchase contract with the United States was negotiated. The latter terminated in April 1953. In January (1955) 250 tons were offered for open bid—50 tons of wolframite in one lot, and 200 tons of scheelite in four lots of 50 tons each. Offices accepting applications were: the main office of *Korea Tungsten Mining Company* in Seoul, Korea; the Korean Consulate General in New York; the Korean Legation in London.

INDIA—Exports of manganese ore during the first nine months of 1954 declined to 803,000 tons, as compared with 1,195,000 tons in the same period of 1953. The Deputy Minister for Commerce and Industry reports that the government is concerned about the decrease, but it is hoped that the abolition of the export duty on manganese ore put through in August 1954 will have a beneficial effect on foreign sales.

MALAYA—Miners are reported to be anxiously scrambling for mining rights to land along the Muar-Yong Road near Paya Bakri village where deposits of columbite have been known for some time. The rush is attributed to the high

price Malaya is obtaining from the United States for her columbite. Export figures so far are insignificant, however. In March 1954 seven tons were exported at a value of \$103,220; in June 7.85 tons valued at \$146,044; in August 15.59 tons at \$292,540; in September 14.10 tons at \$268,407; and in October only 1.89 tons valued at \$37,073.

TURKEY—The Turkish government has reduced the duty on chromium exports from five percent to one percent. The cut was recommended by a special committee studying ways of reviving the country's chrome export trade.

INDIA—The government is reported to have rejected an offer by British investors to build a 1,000,000-ton steel plant in association with Indian businessmen. The rejection is understood to have been caused by the government's desire that major industrial enterprises like steel be government controlled. The cabinet spent some time considering the offer which was considered to be in conflict with an industrial policy resolution framed in 1943. An Indian industrialist, B. M. Birla, had opened negotiations with British investors for the plant and the British government had recently offered to guarantee the British offer through the *Export Credit Corporation*. A Russian steel mission is at present holding conferences with the Indian government on the building of a steel plant which would be government-owned.

PAKISTAN—*Krupps* of Essen, Germany is about to conclude an engineering

arrangement with the Pakistan government for construction of a steel plant in Kalabagh. The plant would be built under the auspices of the *Pakistan Industrial Development Corporation* at a total cost of 300,000,000 rupees. Krupps would be a partial shareholder in the enterprise. Initial output would be 50,000 tons of steel, increasing to 300,000 tons later.

MALAYA—*Kepong Dredging Company Ltd.* reports that its working loss incurred during the year ended June 30, 1954 was due entirely to poor values in the ground dredged throughout the year. The dredge was in operation for 80.54 percent of possible working time and 970,636 cubic yards were dredged for a recovery of 248 tons of tin ore which is equivalent to 0.571 pound per cubic yard. Check boring by percussion drill was started in 1953 and is still proceeding. Results show that while the ground would be unsuitable for dredging, these areas could be worked by tributaries.

BURMA—The *Nanmyin* tungsten mine in the Mergui district close to the Thailand border has been acquired and is now being worked by the Burmese government. A 75-mile road is being built to the mine at a cost of 23,000,000 kyats. Production of tungsten is estimated to be 30 tons per month when the road is completed. Mineral exports from the district for the first nine months of 1952, 1953, and 1954 are compared below:

MINERAL EXPORTS (IN TONS)

Production	1954	1953	1952
Tungsten concentrate	47.90	81.40	28.20
Tin concentrate	412.20	630.00	869.30
Mixed (to Tavoy)	25.90	48.10	57.00
Total in tons	486.00	759.50	954.50

MALAYA—The Federation's Public Trustee and Custodian of Enemy Property is offering for sale three Johore mining properties owned formerly by Japanese firms. One comprises 189 acres on the ranges of a 260-foot hill on the right bank of Sungei Sembong. It is supposed to contain deposits of hematite and some manganese, totaling 634,000 tons. In neighboring Bukit Nibun 514 acres are offered. These were prospected by open pitting before the war and then were estimated to contain 1,500,000 tons of iron ore. Another 111-acre tract is located on the banks of the Endau River, said to contain laterite; this has not been developed at all. The mining lease on the first property expires during the middle of this year and the others expire by October 1956. The Custodian indicated that the Johore government might consider renewing these leases if it were convinced the mines were being properly developed.

INDIA—The Mysore State government is considering further expansion of the state-owned *Mysore Iron and Steel Works* at Bhadravati. The iron works was started in 1923 and has been gradually expanded and modernized. The new expansion, which would be part of the second Five-Year Plan if approved, would include manufacture of stainless steel sheets and wire, and wire nail products. This would make it the first stainless steel plant in the country.

MALAYA—*Eastern Mining & Metals Company's* huge iron ore project at Ulu Rompin in Pahang is moving ahead. Several survey teams are mapping out

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the difficult terrain of the Pahang jungles through which the 50-mile private railway will pass, and the Malayan Railways are also providing expert technical advice to the company on this phase of the work. A team of French geophysicists is carrying out additional geological research at Ulu Rompin, where the annual output is expected eventually to reach 2,000,000 tons. A jetty is being planned for Kuala Rompin on the East Coast; when mining begins the ore will be transported by rail to Kuala Rompin for eventual shipment. See *MINING WORLD*, January 1954, page 63, and April 1954, page 57, for more details.



LATIN AMERICA

BOLIVIA—Patino Mines & Enterprises Consolidated Inc. is negotiating with the Bolivian government for a new payment agreement to replace one entered into in June 1953 and now expiring. The company has submitted proposals for what it thinks it should get for its confiscated holdings and how it should be repaid, but has not yet received an answer. The agreement in 1953 calls for deductions for Patino from proceeds of the sale of tin ores from Patino mines. A sliding scale of payments was tied to the price that the Bolivian government could get for the tin: at less than 80¢ pound, no compensation; 80¢ to 90¢, 1 percent of gross; 90¢ to \$1.06, 2 percent; \$1.06 to \$1.21, 5 percent; and over \$1.21, an additional 1 percent for each 6¢ more than the \$1.21.

BRAZIL—Cia. Vale do Rio Doce exported 1,600,000 metric tons of high-grade iron ore in the 10 months to November 1954, setting a new record. The main goal of the company will be achieved when production reaches 3,000,000 tons annually, and for this purpose the company has already increased its equipment, machinery, and railroad facilities considerably.

MEXICO—Shipments of Mexican-mined silver to Europe totaled 32,500,000 fine ounces during the first 10 months of 1954, according to the Ministry of Finance. Silver exports during the same period of 1953 amounted to 30,400,000 ounces.

PERU—Cerro de Pasco Corporation has completed erection of a new 15,000-foot launder to carry tailing from Casapalca to Quinhuacra. Disposal of tailing from the Casapalca milling operation has long been a serious problem because the mill is located in the narrow valley of Rimac where adequate disposal sites are not readily found. The new launder is expected to solve the problem for the next 10 years.

BRAZIL—Companhia Siderurgica Paulista (Cosipa) has completed its studies regarding the building of a steel plant in Piassaguera, state of Sao Paulo. The company selected Piassaguera because it is close to the city of Sao Paulo, the largest industrial city in South America; it is very close to the port of Santos, the natural entrance for the coal from the mines in the state of Santa Catharina, charcoal from the Ribeira Valley, and iron ore from the Rio Doce area; and

because there are plenty of good roads, water, oil refineries, pipelines, and hydro-electric plants in the area. The new plant would use coke instead of charcoal. Part of the coal will come from Santa Catharina, the rest from the United States. Initial production is planned for 250,000 metric tons annually, with eventual increase to 1,000,000 tons annually.

ARGENTINA—A report analyzing the chrome deposits in the country states that the principal amount is found in the province of Cordoba in a 120-kilometer area, as well as in the province of Mendoza, zone of Uspallata. Development of chrome has increased since World War II, and is now used in the refractory industry and in the manufacture of chrome salts (especially bichromates). Production, however, is small, and is estimated at 2,500 tons a year of 15 percent to 30 percent Cr₂O₃.

BRAZIL—Several iron ore deposits considered to be of commercial value were found recently in the Fagundes region, state of Paraiba. The ore contains magnetite mostly, with an iron content which varies from 55 to 70 percent. The ore also contains some impurities and would be used principally in the production of alloys.

COLOMBIA—Reynolds Metals Company, together with W. R. Grace & Company and a prominent Colombian industrialist, J. Mario Santo Domingo, plans to form a new company in Colombia to manufacture aluminum sheet, foil, and other fabricated aluminum products. The proposed cost, size, construction schedule, and planned source of the primary alum-

inum were not revealed. Reynolds will furnish management and technical personnel, and will train Colombians in its plants in the United States to take over many of the positions in the new firm.



AFRICA

UNION OF SOUTH AFRICA—The Rustenburg Platinum Company, which is developing extensive holdings in the Rustenburg district, Transvaal, has completed the extensions to its treatment plants at the Rustenburg and Union sections which both operated at full capacity throughout 1953/1954. The Central Deep Shaft has been sunk and completed to its final depth, and the installation of the surface equipment is in progress. The matte treatment plant, erected jointly by Rustenburg and Johnson, Matthey companies, has been virtually completed, trial runs have been conducted, and productive operations at the designed capacity will soon be in progress. The plant will treat a portion of the matte output from the smelting plant.

TANGANYIKA—At the Mpanda lead mine of Uruwira Minerals Ltd., the new 1,000-ton-per-day plant is nearing completion and full production is expected by the middle of this year. A loan of £350,000 has been guaranteed by the government against a charge over the

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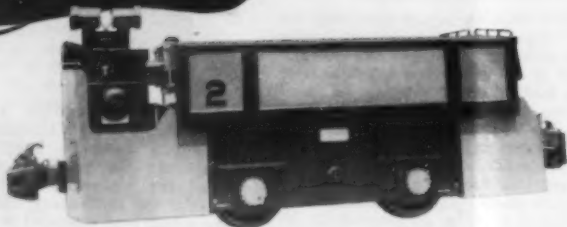
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company's property and assets held jointly by the governments of Tanganyika and the United States. This additional money will help to complete the project. During the erection of the new 120-foot head-gear, hoisting proceeded uninterrupted using the old one. The output of the pilot plant has been temporarily reduced while the upper portion of the main shaft is being relined and reequipped.

NIGERIA—The *United Tin Areas of Nigeria, Ltd.*, recently acquired additional columbite and tin-bearing areas, adjoining the recently acquired areas at Odegi. The new ground comprises 101 acres of mining leases and nine square miles of exclusive prospecting licenses. So far, 160 tons of columbite have already been proved and estimates of all the new holdings are computed to be 500 tons of columbite and 365 tons of tin. As with the original new areas, *Ribon Valley (Nigeria) Tinfields* has one-third interest in the newly acquired holdings.

UNION OF SOUTH AFRICA—Trial runs are now in progress in the *Luispaards Vlei* uranium plant which has a nominal capacity of 50,000 tons a month. Production is expected to start early this year. With the start of the uranium production, the tonnage treated in the gold section will be reduced from the present level of about 110,000 tons a month to 90,000. Due to faulting, the mine has not yet been able to build up ore reserves of the uranium-bearing Bird Reefs adequate for the designed capacity of the uranium section. Consequently, in the initial stages of production, the overall net returns may not compensate fully for the reduction in gold profits. Later the position will improve. It is thought that because of one of the major faults in the mine, it may be possible to open up the Bird Reefs from a number of development ends on the other—that is, the gold reef—horizons.

TANGANYIKA—Erection of the main 7,200-ton-per-day plant is rapidly nearing completion at the diamond property of *Williamson Ltd.* at Mwadui. The six-cubic-yard walking dragline excavator is ready, and the traveling hopper-crusher unit and belt conveyor system are under construction. The final recovery section, which includes the latest grease-belt and electrostatic techniques, will come into operation together with the rest of the plant by the second quarter of this year if all goes well. The current expansion program is being undertaken at a cost of £3,500,000. Diamond output doubled during 1954 by working rich ground; with the new plant in operation, production will be about the same, but much lower grade ground will be workable.

BELGIAN CONGO—In reviewing its prospecting program over the last fiscal year (ended June 30, 1954), *GEOMINES* reports that the proportion of output coming from the *Manono-Kitotolo* deposit dropped to 52.2 percent in the 1953-1954 period; it had been 64.5 percent in the 1952-1953 period, and it is expected to decrease progressively. Recent estimates show now that tin ore reserve in the "stony" zone (underlying the altered zone from which the above production came) is about 70,000 tons of cassiterite, equal in importance to that contained in the altered zone. During the fiscal year 1952/1953, output from this latter section was only 25 percent, while in 1953/1954 it was over 40 percent. Increasing output from this will compensate

for the progressive exhaustion of reserves in the altered zone. More than 100,000 tons of cassiterite have already been proved in the zone of hard rock pegmatites but the full extent of these reserves is believed to be greater than this. Production from this zone accounted for 8.8 percent of the total 1953/1954 output. Cassiterite output during the year amounted to 3,861 metric tons, compared with 3,940 metric tons in the previous year. The slight tonnage drop was caused by the closing down of the central hydro-electric plant for overhaul. The smelter handled 3,922 metric tons of cassiterite, 986 tons of which were from other producers. During the year, 171 metric tons of tantalum-columbium concentrates were recovered compared with 140 in the previous year. Laboratory tests being made on the process for producing lithium carbonate from spodumene in the ore have been successful, and it is being tried out on a "semi-works" scale in Belgium.

UNION OF SOUTH AFRICA—The Merriespruit Orange Free State Mining Company's mine has now been declared a uranium producer and is to erect a flotation plant for the recovery of uranium and pyrite concentrates from the residue slimes of the gold reduction plant. These concentrates will be pumped to the Virginia installations for the extraction of uranium oxide and the production of sulphuric acid, toward the end of this year. The Virginia plants (Virginia Orange Free State Gold Mining Co. Ltd.) are being extended for this purpose. Three factors have been taken into consideration in designing the crusher section of the Merriespruit gold reduction plant: high capital costs; the current tendency to relate working costs to the fine ounces produced rather than to tons milled; and the need to operate the uranium plants as efficiently as possible—that is, to their full productive capacity. Accordingly, the crushing plant provides for hand sorting of waste from ore feed, and hand picking of ore from development rock. A certain measure of beneficiation is thereby achieved, in terms of both gold and uranium grade. The mill is incorporated on a unit basis, each unit incorporating one primary rod mill operating in open-circuit, and four secondary pebble mills operating in closed circuit with hydrocyclone classifiers and plane tables. Each unit has a design capacity of 37,500 tons a month. Two such units are now being installed and two additional units are likely to be added in due time.

GOLD COAST—The Industrial Diamonds of South Africa has acquired the diamond rights over 80 square miles and the timber and agricultural rights over 20 square miles in the Ashanti district. The capital of the company is to be increased to provide funds for developing the concessions which have until the year 2,000 to run out.



PHILIPPINE ISLANDS—John W. Haussermann, president and general manager of Benguet Consolidated Mines, Inc., reports that his firm has concluded

a contract with the United States which calls for shipment of an additional 250,000 tons of chrome ore. The contract increases present ore exports of the firm to 40,000 tons monthly, and increases the country's dollar reserves by \$600,000 monthly. The company will now be exporting 480,000 tons a year valued at \$7,200,000. During a recent seven-month period, the company exported a total of 241,000 tons of chrome ore. Mr. Haussermann also reports that his firm expects to expand its present mining facilities to be able to increase the number of its employees and laborers from 6,400 to 10,000, and to make an additional investment of Pesos 4,000,000 in its expansion program.

WESTERN AUSTRALIA—A claim for mineral rights on a 45-acre area near Marble Bar has been pegged by Professor Harry Messel, Dr. Eric George, and Stuart Stubbs. They report the discovery of gadolinite [BeFe(Yo)(SiO₃)₂], considered a rare and valuable mineral in atomic research. A second prospecting party is scheduled to leave Sydney soon for the area.

NEW GUINEA—Bulolo Gold Dredging Ltd. reports that up to October 17, 1954, 5,787,150 cubic yards of gravel had been dredged for a recovery of 22,308 ounces of fine gold. At \$35.00 per ounce, this amounts to \$780,780, equal to 13.49 cents per yard, and it is estimated that the profit for the year ended May 31, 1955 will be between \$700,000 and \$750,000. A decline in production and profit will result from the permanent closing down of No. 2 dredge at the end of 1954. No. 4 dredge is expected to operate until the end of 1955, with the two

remaining dredges—No. 5 and 7—operating until the middle of 1959.

NORTHERN AUSTRALIA—Areas over which North Australian Uranium Corporation has rights have recently been inspected by Rio Tinto Ltd. The London firm may finance and carry out an intensive prospecting and exploration program; if ore bodies of suitable size are found, a joint working arrangement will be made. N.A.U.C. has also reported that mineral occurrences on its Scinto area, at South Alligator River, indicate the same potential as Sleisbeck No. 4 exposure. On Scinto No. 6, trenching indicates ore of 3.35 percent uranium oxide and 2.5 percent, while an assay from Scinto No. 5 was 2.1 percent. The Sleisbeck No. 4 development has a length of at least 350 feet of ore. Rio Tinto Ltd. has also asked Uranium Development and Prospecting N.L. for an option over that company's holdings in the South Alligator River area. Rio Tinto has also registered the Rio Tinto Management Services Ltd. in Melbourne, Victoria, as a subsidiary with a capital of £100,000 to search for, acquire, test, and develop mining properties.

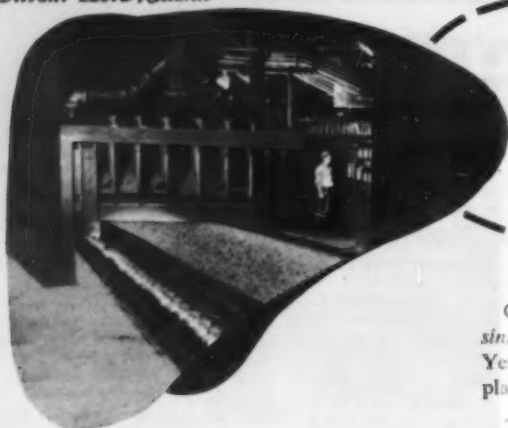
PHILIPPINE ISLANDS—The Philippine Iron Mines at Larap Camarines Norte, will move its experimental washing plant operation to the rail spurline side of the peninsula after disappointing operations at Incline 16. The plant will be re-erected in conjunction with a secondary screening plant, conveyor, and picking belt, and put into use on test recovery of float ore. The new site appears to be the most encouraging location in Larap for washing of screened ore. A few operating refinements will be at this plant, and it is hoped that these modifications will be

Where U₃O₈ and Mercury Was Found in Philippines

Uranium and mercury discoveries made recently in the Philippine Islands have attracted world-wide interest. First report of the uranium discovery in the technical press was in the January 1955 issue of MINING WORLD, page 50. This discovery was made on the property of the Philippine Iron Mines, Inc. at Larap, Camarines Norte. The place-fix map at right shows location of the deposit. A. Soriano y Cia's consulting geologist, George T. Scholey, and Philippine Iron's chief geologist, J. Frost, have since checked stored diamond drill cores originally taken for molybdenum. One hole had a section 44 feet wide averaging 0.10 percent U₃O₈, 2.34 percent copper and 0.88 percent MoS₅. This section of drill core was taken at a point 300 feet below and 300 feet east of the initial discovery announced in MINING WORLD. This core also showed a section 7 feet wide at 200 foot depth assaying 0.20 percent U₃O₈, 0.49 percent copper, and 1.1 MoS₅. While there is a strong current of optimism in the Islands regarding the discovery Soriano engineers know that a great deal of prospecting and development work must be done to block out any tonnage. Metallurgical difficulties must also be overcome. It is believed, however, that the copper and molybdenum minerals can be first recovered by flotation and the tailing acid leached for uranium extraction. Location of the mercury discovery is also shown on the map. While mercury has been reported from a number of places this is the first commercial deposit. Geological conditions are favorable for mercury occurrences in many other places in the Islands. Plans are underway for mercury production and a 100-ton per day furnace kiln is now being built in the United States. The mercury discovery and mine operation will be by Palawan Quicksilver, Inc. George Newman is the firm's manager.



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sufficiently beneficial to merit the establishment of a definite method of washing screened ore.

AUSTRALIA—The Tariff Board has recommended against any financial assistance for the tin producing industry. The board reportedly considers that the decline in production in recent years has been due to depletion of reserves as well as the price of tin. The present cost of tin production in Australia is stated to be £A750 per ton, compared with £915 in Malaya. Currently there are two main Australian producers: *Tableland Tin Dredging N.L.* at Mount Garnet, Queensland, and *Aberfoyle Tin N.L.* at Rossard, Tasmania.

NEW SOUTH WALES—*New England Antimony Mines N.L.* at Guyra expects to begin production of concentrates early this year. Ore is reported to contain as much as 25 percent antimony, as sulphide, and tonnage will begin at 400 per month. Australia is currently importing antimony concentrate from the Union of South Africa—*Consolidated Murchison (Transvaal) Goldfields and Development Company*—so that local production of raw material will be most welcome. The country's only antimony smelter, operated by *O. T. Lempriere & Co., Ltd.*, is in Sydney.



NORTH AMERICA

BRITISH COLUMBIA — *Granduc Mines, Ltd.* has hired *Patricia Transportation Company* to haul about 800 tons of mining supplies and equipment by tractor train to the *Granduc* copper mine 25 miles from Stewart. The route leads across the Salmon and Leduc glaciers. Exploration work, halted by lack of fuel, is scheduled to be resumed in February. A decision on a milling plant is expected to be made by the end of the 1955 season. Alaskan authorities are offering special inducements for *Granduc* to locate production facilities on the Alaskan side of the Panhandle. The British Columbian government has reportedly offered to match any contribution the federal government may make to keep the plant on the Canadian side.

ONTARIO—*Stanleigh Uranium Mining Corporation Ltd.*, an affiliate of *Standard Ore and Alloys Corporation* of New York, has started work on its mining properties consisting of about 20 square miles in the Blind River region of Canada, adjoining the *Algoma* deposits. A permanent winter camp has been established and a road built to the property. Diamond drill rigs are now in operation, with the drilling contract awarded to *N. Morissette Diamond Drilling Ltd.* of Haileybury, Ontario. The program calls for a preliminary drilling of 18,000 feet at a cost slightly in excess of \$100,000 and with a total of \$250,000 earmarked to get a true understanding of the deposit.

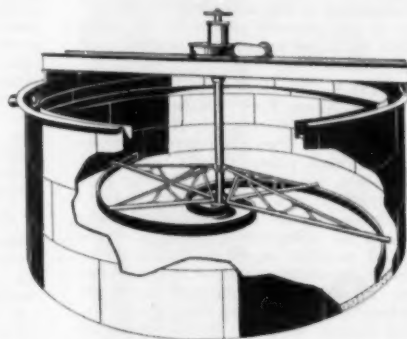
ALASKA—The *Kodiak Exploration Company, Inc.* has been organized and has staked 17 claims between the Ski-Chalet and Sheartin Bay where scheelite ore has reportedly been located. George

H. Cornelius is president and Paul Dupler, secretary-treasurer.

ONTARIO—*Algoma Uranium Mines Ltd.*'s main production shaft at the Quirke ore body is advancing at a fast rate and has now reached the fourth level. The ore zone was opened up by crosscutting at the third level, and passed through in the shaft between the third and fourth levels. Construction of two permanent buildings is now about completed. At the Nordic section, a contract has been let for the sinking of the main production shaft and work has started. This will be a vertical five-compartment shaft to a depth of 800 feet.

QUEBEC—*Eldrich Mines* has started shaft sinking at its gold property in the Noranda district after collaring the shaft to a depth of 40 feet and erecting a 90-foot production size headframe. Most of the mine buildings have been completed and the hoist and electric transformers installed. The three-compartment shaft is to be sunk to a depth of 1,000 feet. Participating in the \$1,000,000 financing for the project are *Elder Mines* (40 percent), *Lamaque Mining Company* (40 percent), and *Goldale Mines* (20 percent).

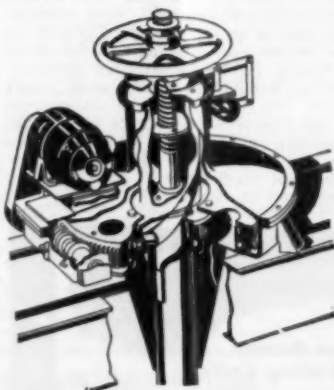
ALASKA—A new firm, *Uranium Corporation of Alaska*, has been formed by



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[World Mining Section—55]

Senator Charles D. Jones of Nome, Tom B. Reilly and Thomas Jones of Seward, and Elinor Hicks and Casimer Cechowski of Anchorage, Incorporated at Olym-pia, Washington, is another Alaskan firm which has been formed by James W. Boothe of Seattle, and L. E. Bigham and Frances F. Bigham of Hyder, Alaska. Mr. Bigham is president and Mr. Boothe is secretary-treasurer. The company has holdings in silver, lead, zinc, and gold-bearing areas between Hyder and Stewart, British Columbia.

SASKATCHEWAN—Cliz Athabasca Uranium Mines Ltd. plans to renew diamond drilling exploration on its 38-claim Beaverlodge Camp property. An initial 14 drill hole program is recommended, influenced by the recent significant ore development of the underground exploration at the property of *Lorado Uranium Mines Ltd.*, one mile to the northwest of Cliz's claims.

ALASKA—The newest uranium center is in the Nixon Fork district, 40 miles northeast of McGrath about 12 miles from Medfra. Two Northern Consolidated Airlines pilots, Jerry Church and Ed Steger, filed 14 claims in the area and this started a rush into the district. Samples tested by the Anchorage assay office of the Territorial Division of Mines showed positive uranium and negative thorium, according to Mr. Church. However, Harold Strandberg and his three brothers have been operating a copper-gold deposit adjacent to the reported uranium claims, and they caution against undue optimism. According to Mr. Strandberg, they have had radioactive samples in their three years of operation there but nothing to indicate any commercial grade of mineralization.

ONTARIO—To help offset higher production costs, *The International Nickel Company of Canada, Ltd.* has increased its nickel prices. The company's subsidiaries, *The International Nickel Company, Inc.* (United States) and *The Mond Nickel Company, Ltd.* (United Kingdom), have followed suit. An increase of 4¢ cents per pound on the price of the refined nickel brings the export price from the Port Colborne refinery (Ontario) refinery to 64¢ cents (U.S.) per pound, including the 1½¢ United States import duty which is paid by the company. Similar changes were announced for nickel oxide sinter and other forms of primary nickel.

BRITISH COLUMBIA—*Yankee Dundee Mines Ltd.* is reported to have obtained financial backing in the United

States to carry out a deep exploration program at its mine in Ymir. The property has been a gold-silver-lead-zinc producer.

ONTARIO—*Buckles Algoma Uranium Mines Ltd.* has started shaft sinking operations on its property in the Algoma district. Initial objective is to open up the main productive ore zone in order to obtain bulk samples for pilot plant test work at Ottawa.

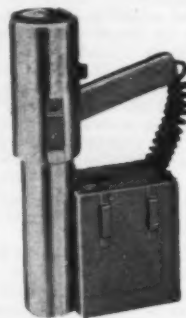
NEW BRUNSWICK—*Bellechasse Mining Corporation, Ltd.* has started exploratory work on its recently staked 600-acre property immediately west of the important ore find made by the *American Metals Company* at North Little River Lake. This is one of three properties held by Bellechasse in New Brunswick. The company also plans an intensive trenching program at its recently discovered 3,000-acre nickel-copper property 100 miles north of Sept Iles, Quebec, immediately after freeze-up. Numerous companies are optioning property in the area around the American Metals discovery. *Pacific (Eastern) Gold Mines* has acquired under option a group of 400 claims about two miles north of American Metals' holdings, and *Edco Mining and Explorations Ltd.* has property adjoining American Metals.

ALASKA—Six Anchorage men are reported to have filed eight claims on secondary uranium-bearing ore in the Shirley Lake area, 110 air miles northwest of Anchorage. The group plans to incorporate as *United Six Mining Corporation*. Edward Clutis first located the deposit. He is associated in the venture with Van Fedder, George Kitchen, H. F. McWilliams, Arthur Henson, and Emil Cigliotti. Ore samples have been sent to College,

BRITISH COLUMBIA—*Aluminum Company of Canada, Ltd.* already plans to expand the capacity of its new aluminum smelter at Kitimat which went into operation in August. Market studies revealed that demand for the company's ingots exceeded the supply available from present production and would probably continue to increase. About \$45,000,000 will be spent in 1955 and 1956 to add 60,000 tons of aluminum ingot capacity per year, or an increase of 65 percent of the present rated capacity of the plant. A fourth 140,000-horsepower generator will be installed in the Kemano power house. The basic hydraulic components of the project were built to support an aluminum capacity of at least three times the size of the initial plant so the new additional facilities will have a much lower unit capital cost.

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U.S.A. Metal & Mineral Prices

METALS

January 15, 1955

COPPER:	Electrolytic, Delivered F.o.b. cars, Valley basis	30.00c
	Lake, Delivered, destinations, U.S.A.	30.00c
	Foreign Copper, Valley basis	30.00c
LEAD:	Common Grade, New York	15.00c
	Tri-State Concentrates, jig, flotation 80% lead, per ton, Eagle-Picher	\$187.50
ZINC:	Prime Western; F.o.b. E. St. Louis	11.50c
	Prime Western; Delivered, New York	12.00c
	Tri-State Concentrate, 60% zinc, per ton	\$68.00
	Primary 30 Pound Ingots (99% plus), F.o.b. shipping points	23.20c
ALUMINUM:	Lone Star Brand, F.o.b. Laredo, in bulk	29.00c
ANTIMONY:	(in ton lots) price per pound	\$2.25
BISMUTH:	Sticks and bars, 1 to 5 ton lots (Price per pound)	\$1.70
CADMIUM:	97-99%, keg of 550 pounds (Price per pound)	\$2.60
COBALT:	Powder	Nom., per pound
COLUMBIUM:	98% (per pound)	\$10.00-\$13.00
LITHIUM:	Ingots (99.8%), F.o.b. Freeport, Texas	27.75c
MAGNESIUM:	Flasks, Small lots, New York	\$322.00-\$324.00
MERCURY:	"B" Ingots (5 pounds), F.o.b. refinery, Port Colborne, Ontario	64.50c
NICKEL:	Grade A, Brands, New York (Price per pound) Prompt delivery	85.875c
TIN:	99.3% + Grade "A" (Price per pound)	\$4.50
TITANIUM:	United States Treasury price	\$35.00 per ounce
GOLD:	Newly mined domestic, United States Treasury price	90 1/2¢ per ounce
SILVER:	Foreign Handy & Harman	85.25¢ per ounce
PLATINUM:	Per Duncie	\$82.00-\$84.00
ZIRCONIUM:	Sponge, Per Pound	\$10.00

ORES AND CONCENTRATES

BERYLLIUM ORE:	10 to 12% BeO, F.o.b. mine, Colorado	\$47.00 per unit
	Small lot purchases at Custer, S. D., Spruce Pine, N. C. and Franklin, N. H. Visual inspection at \$400.00 per short ton or by assaying at: 8.0 to 8.9% BeO, \$40 per unit; 9.0 to 9.9%, \$45; over 10.0%, \$50.	
CHROME ORE:	F.o.b. railroad cars eastern seaports. Long tons dry weight.	
	African (Rhodesia), 48% Cr ₂ O ₃ , 3 to 1 Ratio	\$44.00-\$45.00
	African (Transvaal), 48% Cr ₂ O ₃ , No Ratio	\$31.00-\$32.00
	Turkish, 48% Cr ₂ O ₃ , 3 to 1 chrome-iron ratio	\$46.00
	U. S. Government ore purchase depot Grants Pass, Oregon, base price, lump ore, \$115.00; fines and concentrates \$110.00 for 48% Cr ₂ O ₃ and a 3 to 1 chromium-iron ratio. Premiums for higher grade ore and for a ratio up to 3.5 to 1. Penalties for grades down to 42% Cr ₂ O ₃ .	
COLUMBIUM-TANTALUM ORE:	At United States small lot beryl purchase depots, \$3.40 per pound contained combined pentoxides in 50% ore. Includes 100% bonus.	
IRON ORE:	Lake Superior, Per gross ton Lower Lake Ports	\$9.90
	Mesebi, Non Bessemer, 51.5% Fe, Second quarter	\$10.05
	Mesebi, Bessemer, 51.5% Fe, Second quarter	\$10.15
	Old Range Bessemer, Second quarter	\$10.30
	Swedish, Atlantic Ports, 60 to 68% Fe, Contracts, Per Unit	\$22.00c
MANGANESE ORE:	Metallurgical grade, 48 to 50% Mn, Long ton unit	\$0.85
	Metallurgical grade, 46 to 48% Mn, Long ton unit	\$0.75
	Metallurgical grade, 45 to 46% Mn, Long ton unit	\$0.65
	Chemical grade, 80% MnO ₂ , Per ton	\$70.00
	Domestic U. S. Government ore purchasing depots: Deming, New Mexico, base price \$2.30 per long dry ton unit of recoverable manganese less handling and treating costs. Wenden, Arizona; base price of \$8.54 per long dry ton of 15% manganese ore. Butte, Montana; (black and pink ores) base price of \$4.87 per long dry ton of 18% manganese ore. Phillipsburg, Montana base price of \$6.43 per long ton unit of 15% manganese ore. Small lot program f.o.b. railroad cars, minimum 40% Mn. Base price (48%) \$2.30 per unit with premiums and penalties.	
MOLYBDENUM CONCENTRATE:	90% MoS ₅ F.o.b. Climax, Colorado, Per pound of contained molybdenum, plus cost of containers	\$1.05
TUNGSTEN CONCENTRATE:	Domestic, 60% WO ₃ Per short ton unit	\$63.00-\$65.00
	Foreign, 65% WO ₃ Per short ton unit (Schellite)	\$26.00-\$27.00
URANIUM ORE:	Foreign, South American, Spanish, Portuguese	\$27.00
	Carnotite-Rescoelite, F.o.b. purchase depot plus \$0.06 per ton mile (\$6.00 maximum), Grand Junction, Rifle, Durango, Naturita and Uravan, Colorado Salt Lake City, Marysville, Thompsons, Moab, Hite, and Monticello, Utah, Shiprock, and Bluewater, New Mexico, Edgemont, S. Dakota, Riverton, Wyoming. Base price for 0.10% ore is \$1.50 per pound and up to \$3.50 per pound of contained U ₃ O ₈ plus \$0.75 per pound for each pound in excess of 4 pounds per short dry ton and an extra allowance of \$0.25 per pound for each in excess of 10 pounds. A \$0.50 per pound development allowance paid on all ores purchases. At Shiprock all ores with more than 6% lime are penalized for excess lime.	
VANADIUM ORE:	Carnotite-Rescoelite, V ₂ O ₅ in ratio of more than 10 parts to 1 part of U ₃ O ₈ are generally acceptable at all AEC depots, but excess not paid for at Marysville, Monticello, Shiprock, and Bluewater	Per Pound V ₂ O ₅ \$0.31

NON-METALLIC MINERALS

BENTONITE:	Minus-200-mesh, F.o.b. Wyoming points, Per ton in carload lots	\$12.50
	Oil Well grade, Packed in 100 pound paper bags	\$14.00
FLUORSPAR:	Metallurgical grade, 70% effective CaF ₂ content per short ton F.o.b. Illinois-Kentucky mines	\$32.00
	Mexican, 70% f.o.b. border	\$22.00
	European, Atlantic Ports, 70%	\$20.00
	Acid Grade, 97% CaF ₂ , F.o.b. Kentucky, Illinois, Colorado	\$50.00
PERLITE:	Crude: F.o.b. mine per short ton	\$3.00 to \$5.00
	Plaster grades, Crushed and sized, F.o.b. plants	\$7.00 to \$9.00
SULPHUR:	Long ton, F.o.b. Haskins Mound, Texas	\$25.5c
	Export	\$30.5c

LONDON METAL AND MINERAL PRICES

January 15, 1955

Per Long Ton USA Equivalent cents per pound¹

COPPER:	Electrolytic, spot	£306	0s	0d	38.25c
LEAD:	Refined, 99.9%	£104	0s	0d	13.00c
ZINC:	Virgin, 98%	£ 85	0s	0d	10.62c
ALUMINUM:	Ingot, 99.5%	£156	0s	0d	19.50c
ANTIMONY:	Regulus, 99.6%	£210	0s	0d	26.25c
TIN:	Standard 99.75%	£681	0s	0d	85.125c
TUNGSTEN:	Long ton unit, 20% equivalent to				\$28.14

1. With Sterling pound at \$2.80.

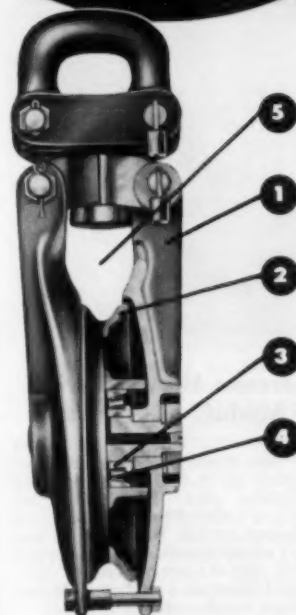
Quotations on metals and certain ores through the courtesy of American Metal Market, New York, N.Y.

FEBRUARY 1955

[World Mining Section-57]

Pacific SHEAVE BLOCKS

give you
MORE
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OUTSTANDING FEATURES:

1. The only Sheave Blocks with manganese steel sheaves and side frames for toughness, shock resistance and long life.
2. Sheave rims are recessed into side frames to prevent rope fouling.
3. Efficient grease seals retain lubricant and exclude foreign material.
4. Tapered roller bearings are load-rated with extra-high safety factor.
5. Wide throat passes square knots.

Available in Half Side Plate and Full Side Plate Models in 8", 10" and 12" sizes with hook, shackle or safety swivel shackle. Send for name of nearest representative and for Bulletin No. 238 covering complete line.

OTHER PACIFIC PRODUCTS: Jaw Crushers, "Slushmaster" Scrapers, "Round-The-Corner" Sheave Blocks, Bit Knockers and a wide variety of Pacific Wearing Parts.

ALLOY STEEL & METALS CO.

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PRODUCTION EQUIPMENT PREVIEW

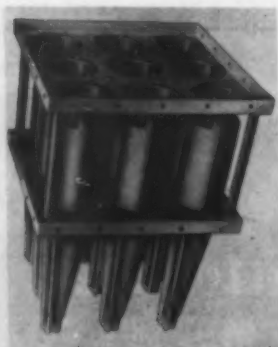
PEP is just what new equipment, increased mechanization, and new methods can give to your mine, mill or smelter. This PEP section is MINING WORLD's way of making available to you some of the finest current information on mechanization.



Tractorama Shows Unveil 1955 Models of Crawlers

Twelve new 1955 models of crawler tractors, attachments and trailers, together with an exclusive new low-cost lease-purchase plan, have been announced in a series of special Tractorama shows throughout the United States and Canada. Factory-distributor branches and dealers of the American Tractor Corporation, Churubusco (Fort Wayne), Indiana, are staging the shows.

Shown above is the Model 500 TerraTrac loader. This unit is available in $\frac{1}{2}$, $\frac{3}{4}$, and 1 yard sizes, with a tilting trailer to speed transport between jobs. It can be obtained under a long term lease plan, with or without option to buy, with less cash down and lower monthly payments than it takes to finance the average new car, according to reports issued by the company. For details circle No. 70.



New Compact Granular Dust Collector for Industry

American Air Filter Company's new outside-in twist dust collector reverses the

normal tangential flow of most centrifugal dust collectors. The company reports that this feature is credited with giving the AMERclone a high efficiency over a wide range of air volumes. A conical inlet imparts a swirling motion to dust particles, while permitting clean air to travel through the AMERclone tube without changing direction. Each tube has an approach velocity of 1,000 feet-per-minute and a cleaning capacity of 333 feet-per-minute. For more information circle No. 60.



Bin Level Indicator Uses Built-In Signal Light

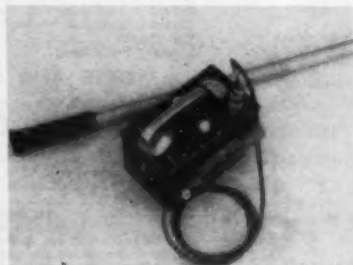
A new bin level indicator incorporating a built-in bull's eye signal light has been designed by the Bin-Dicator Company, Detroit, Michigan. The unit is for use in installations requiring a signal which can readily be seen by an operator. The new model has been designated Model "AL" Special Bin-Dicator, and comes completely assembled and ready for connection to the user's power source. It costs \$12.50 more than a standard model. Circle No. 68.

Exit Gas Scrubbing Process Boosts Acid Plant Capacity

Olin Mathieson Chemical Corporation reports that substantial increases in capacity from existing contact sulphuric acid plants are possible with a 2-stage exit gas scrubbing process now being offered for licensing to other manufacturers. The scrubber returns sulphur lost to the atmosphere in the form of SO_2 and SO_3 to the production system. Even at the most efficient rates of operation of contact plants, some sulphur is lost in exit gases. It is said that increases as high as 20 percent have been demonstrated, and greater increases are possible.

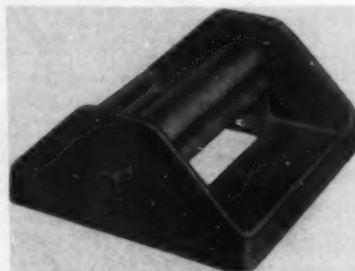
The Consolidated Mining and Smelting Company of Canada Ltd. developed the process originally, and Olin Mathieson has exclusive licensing rights in the

United States. The company has established a Western Sulphur & Acids Division at Little Rock, Arkansas, which will offer engineering consulting service. For more information circle No. 66.



New Geiger Counters For Field Use are Low in Cost

Following an in-the-field survey of requirements, Fisher Research Laboratory, Inc., Palo Alto, California, has developed two new instruments. The Uranium Scout is self-contained with the Geiger tube mounted in the instrument case. The Uranium Scout de luxe has the tube mounted in the end of the improved version of the Fisher Prospecting stick. Three ranges of sensitivity are incorporated in both models. Cost is \$99.50 for the Uranium Scout and \$139.50 for the Uranium Scout de luxe. Circle No. 72 for more information.



Rail Dolly Cuts Damage to Track During Installation

A rail dolly made especially for driving up expansion, installing welding rail and changing switch points has just been announced by Templeton, Kenly & Co., Broadview, Illinois. Essentially a roller mounted on a low stand, the dolly is designed for use in pairs to permit the easy movement of even the heaviest rail. When used for bumping the unit is said to increase safety and cut damage to rail ends because the bumping rail can be more easily controlled. Price: about \$10.00. Circle No. 73.

PORTABLE COMPRESSORS: Complete up-to-date information is available on Chicago Pneumatic portable rotary compressors. These new CP "Power Vane" compressors are said to weigh less than piston type units of half their capacity and occupy 30% less space than equivalent piston types. They are available in 125, 210, 365 and 600 c.f.m. sizes. Circle No. 10.

SCINTILLATION COUNTER: The most sensitive scintillation counter for its price in the world, is the way Jeb Instruments of Los Angeles describe their Groundaire. For information circle No. 11.

WIRE ROPE FITTING: A new wire rope fitting called the Wedge Type Choker Socket has been developed by Electric Steel Foundry Company. It is designed to provide a quick method of putting an eye in a piece of wire rope and can be field installed without special tools in 3 minutes. Circle No. 12 for additional details.

FLEXIBLE PLASTIC PIPE: A new lightweight flexible plastic pipe has been developed by Quaker Rubber Corporation, Division of H. K. Porter Company, Inc. The plastic pipe is made of 100% virgin polyethylene resin and will not rot, rust or corrode. For more information circle No. 16.

HYDRAULIC DRILL JUMPOS: Bulletin J-100 describes straight and offset hydraulic lift and swing cylinders, and hydraulic pumps, for mounting on any suitable chassis or vehicle. The descriptive material, assembled by Gardner-Denver, also includes hydraulic drill jumbos for rail service. Circle No. 22 for a copy.

TEMPERATURE CONTROL: A photo-electric pyrometer, developed by Photo-switch Division of Electronics Corporation of America, provides electronic control of the temperature of hot materials for industrial processes. For complete particulars circle No. 23.

CYCLONE MUFLER: Yale & Towne Manufacturing Company has developed a cyclone muffler, designed to capture carbon particles from the exhaust stream and eliminate the discharge of ignited solids in exhaust gases of gasoline or Diesel powered trucks. Details can be obtained by circling No. 24.

SPECTROGRAPH: Chemist's chores are performed automatically by the Norleco Autometer according to North American Phillips Company, Inc. This automatic

multi-element indexing X-ray spectrograph gives percentages of as many as 12 elements in a specimen in a range of over 71 elements in the periodic table. Circle No. 25.

FILTER CLOTH SELECTION: To help select the right filter cloth for any application in filtration or dust collection, all available engineering data has been assembled in one 6-page folder by Filtration Fabrics Division, Filtration Engineers, Inc. For your copy circle No. 26.

MELTING EQUIPMENT: The Inducto Heating and Melting Equipment, a newly-designed line of high frequency induction equipment for ferrous or non-ferrous metals, has been announced by Inductotherm Corp. Circle No. 27 for more information.

HYDROCOONE CRUSHER with speed-set hydraulic adjustment is described in Bulletin 07B7145B, published by Allis-Chalmers Manufacturing Company, Milwaukee 1, Wisconsin. Oil pumped into or out of a jack raises or lowers the crushing mantle and changes the product size. Circle No. 1.

ACID-PROOF SUMP PUMP made by Galigher Company, Salt Lake City, finds a wide variety of applications in the mining and metallurgical industry. It reportedly pumps corrosive liquids and pulps containing up to 60 percent solids, and does not air lock or choke. For details circle No. 2.

DIAMOND CORE DRILL: The E. J. Longyear Company describe their Longyear "44" as a drill-runners drill. Capacity is rated at 3,000 to 4,000 feet of "A" rods; drive is either Diesel, electric or air. A new swivel head handles all sizes of rods, including 2-7/8 inch flush-coupled; Longyear wire line; and the newly adopted world standards. Bulletin 90 gives complete details. Circle No. 3.

SMELTING ON SITE may save high transportation and treatment charges on your ores and concentrates. The Mace Company, Denver, Colorado, furnish sintering hearths and Mace furnaces in standard sizes ranging from 5 to 250 tons. For more information circle No. 4.

NEW ORE DRESSING REAGENT: Guartec, a product developed through research by General Mills, Inc., may help solve a concentration problem. It is said to be an efficient flocculant which may speed settling and filtration. It has also been used as a fast working depressant. Circle No. 9.

COPCO EQUIPMENT CATALOG: Copco Pacific, Ltd., illustrates in a new 12-page booklet its complete line of Atlas-Copco equipment for mining. Product coverage ranges from the well-known rock drills to new Atlas all purpose hoists. Copies of booklet CP-65 are available from the company at 930 Brittan Avenue, San Carlos, California or by circling No. 14.

DYNAMIC RESPONSE MOTORS: Reliance Electric & Engineering Co. has introduced a new line of DC motors, known as the Super "T" Line. These new motors are described as producing the fastest and most accurate response ever offered in a standard design motor. Sizes range from 20 to 100 horsepower. Circle No. 15.

HUGE FRONT END LOADER: Mixer-Mobile Manufacturers of Portland, Oregon have developed a large front end loader specifically designed for handling light weight material. It is equipped with either a 10 cubic yard bucket or a 4 cubic yard bucket for conventional tasks. Lifting capacity of the hydraulic boom is 18,000 pounds. Circle No. 17.

SCINTILLATION COUNTERS: National Radiac, Inc., Newark, New Jersey is offering a new scintillation counter which can be used with any of twelve different crystal detectors. Alpha particles, beta particles, and gamma rays can be measured separately. For details circle No. 18.

SCRAPER HOIST CATALOG: A full line of air and electric hoists is described in a comprehensive catalog published by Ingersoll-Rand. Applications and single, double and triple hoists are covered. Drawings and cut-away photos simplify discussions. For a copy of form 5800-A write the company at 11 Broadway, New York 4, N. Y. or circle No. 19.

PLASTIC PIPE is now available for industrial uses through Easton Plastic Products Company, Inc., Easton, Pennsylvania. The pipe can be threaded and used with rigid PVC fittings. Prices range from 15 cents for 1/4-inch size to \$1.52 for the 2-inch size. For more information circle No. 20.

HYDRAULIC HOSE: Joy Manufacturing Company has announced the introduction of a new line of hydraulic hose and couplings, tradenamed "Surgepruf," for medium and high pressure service. The couplings feature a double-wedge grip which makes possible assembly on rubber covered hose without skiving according to the manufacturer. For complete details circle No. 21.

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FEEDS, WEIGHS & CONVEYS: Dwight-Lloyd, Inc., Division of Sintering Machinery Corporation has a new bulletin (No. 301) out on the Transportfeeder. This unit rolls into one operation—feed regulation, integrated weighing, and conveying. Circle No. 5 for your copy.

DIAMOND BITS: Bulletin 320 published by Sprague & Henwood, Inc. illustrates and describes all types of diamond drill bits. Oriented diamond bits are available at no advance in price. Circle No. 6.

FREE FLOW of stubborn materials through bins, hoppers and chutes is aided by pulsating magnet vibrators manufactured by the Syntro Company, Homer City, Pennsylvania. For complete details on the unit circle No. 7.

LONG ARMS FOR YOUR TRACTOR: A highly informative bulletin released by Sauerman Bros., Inc. gives scraper and slackline bucket sizes for tractors rated at 40 to 150 horsepower. Full particulars on tractor-powered Sauerman Scraper Machines can be obtained by writing to the company at Department M-33, 620 S. 26th Ave., Bellwood, Ill. or by circling No. 8.

ARC WELDING: A new covered manganese bronze electrode for high speed metal-arc welding of manganese bronze and yellow brass castings and sheet and plate has been announced by the Welding Department of Ampco Metal, Inc., Milwaukee, Wisconsin. For information of this new product known as Mang-Trods circle No. 28.

IMPROVED ARC WELDING: Higher welding speeds, better quality welds, and lower operating costs are the principal benefits claimed for a new consumable-electrode, inert gas, arc welding process developed by scientists and engineers of Westinghouse Electric Corporation. For more information circle No. 30.

STRIPPING FOR METAL, new Caterpillar-produced 12-page booklet written for the strip mining industry, should be of special interest to all mine owners and operators. Photographs and descriptions of various tractor and haulage combinations are included. Circle No. 32 for your copy.

NEW GEIGER COUNTER: The Radiac Company, Inc., New York City announces the availability of the "Tactile," a new type of Geiger Counter for uranium prospecting. The unit contains a loudspeaker, and has four ranges of sensitivity includ-

ing the background range. Circle No. 13 for additional details.

GEIGER COUNTER-ASSAYER: A portable, lightweight Geiger counter that permits field assay of radioactive substance and gives an accurate, timed count is being introduced by Hoffman Laboratories, Inc., Los Angeles, Cal. Price is \$250.00. For further information circle No. 40.

BIN LEVEL CONTROL: An improved type heavy duty "Tellevel" bin level control is now being marketed by Stephens-Adamson Mfg. Company. Switch housing and deflector mechanism have been redesigned to reduce the possibility of sticky material building up on the unit. Bulletin 11-0 describes the details. Circle No. 41.

MORSE TORQUE LIMITERS: An improved line of machinery drive overload protection devices featuring high-friction, wearproof friction disks is now available from Morse Chain Company, Detroit, Michigan. For more information circle No. 43.

PORTABLE HEAT: The Silent Glow Oil Burner Corp. offers eight models of portable heaters, either the radiant type or forced air type. These units are ideal for cold weather operations when you need heat in a hurry. Circle No. 45 for information.

FAST INSTRUMENT LEVELING: There are no footscrews on the Kern GK-1 level; they've been replaced on the Swiss optical surveying instrument by a ball and socket head. This head, in combination with a bulls-eye level permits leveling up in seconds. For details circle No. 46.

LABORATORY CRUSHERS: All laboratory crushers, rolls and grinders made by the Sturtevant Mill Company have "open door" accessibility which permits quick, thorough cleaning. For descriptive material circle No. 47.

PIPE COUPLINGS: A new 16-page illustrated folder on malleable pipe couplings and fittings has been published by Gustin-Bacon Manufacturing Company, Kansas City. Pictures demonstrate the savings in time and labor made by Rolagrip couplings for plain-end pipe and Gruvagrip and Gruvjoint couplings for grooved pipe. Circle No. 48.

DRILL BITS: Anton Smit & Co., Inc. will help you choose the right matrix for your diamond drill job. For information and prices circle No. 50.

RUBBER PRODUCTS: A new 58-page, case-bound general catalog on industrial rubber products manufactured by Quaker Rubber Corporation, Division of H. K. Porter Company, Inc. is now available for distribution. For copies write the above company at Tacony and Comly Streets, Philadelphia 24, Pa., or circle No. 31.

AUTOMATIC SAMPLING, a recognized savings in modern plants, and its application to many problems is discussed in a new bulletin published by Denver Equipment Company. Specifications, detailed data, charts, and photographs describe various Denver samplers. Circle No. 35.

URANIUM BOOKLET: How to Make Money Prospecting for Uranium is the title of a 16-page booklet released by Nucleonic Company of America, Brooklyn, New York. Also available is a Geiger Counter Comparator Chart. For copies circle No. 36.

NEAR-SURFACE SEISMIC DATA over a depth range of 100 to 2500 feet is now said to be possible with the Houston Technical Laboratories High Resolution Seismic System. This geophysical prospecting development makes possible reflection surveys for the mining industry. Further information is contained in bulletin S-303. Circle No. 37.

FROTH FLOTATION, a valuable, authoritative paper taken from the book, "Foams: Theory and Industrial Applications," is being distributed by the American Cyanamid Company. The history, function of reagents, flotation machines and examples of practice are given. Circle No. 38.

NEW BATCHING SCALE: A new industrial batching scale, announced by Richardson Scale Company, is specially designed for weighing hot materials in high tonnage quantities. Key features are an extra-large hopper (25 cubic feet), a dust-tight housing covering the unit and separately housed controls. For additional details circle No. 39.

SCINTILLATION COUNTERS: A small, lightweight portable scintillation counter for use in geologic field work and in prospecting for radioactive material is described in a report released by the Department of Interior. The instrument weighs about 7 pounds, and is available from several manufacturers for about \$500. Copies of the report may be obtained from the Geological Survey, Washington 25, D. C.

For Free Product Literature
see other side

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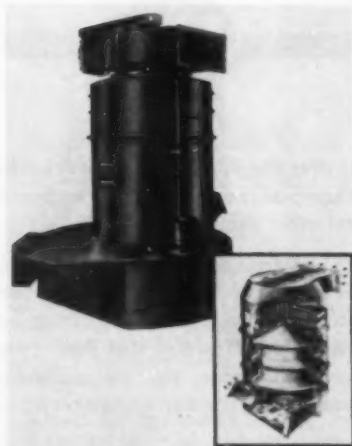
U. S. A.



Tournatractor Features Highlighted in Folder

A 28-page folder describing and illustrating features of the 208 horsepower rubber-tired tractor built by LeTourneau-Westinghouse Company, Peoria, Illinois, has been issued.

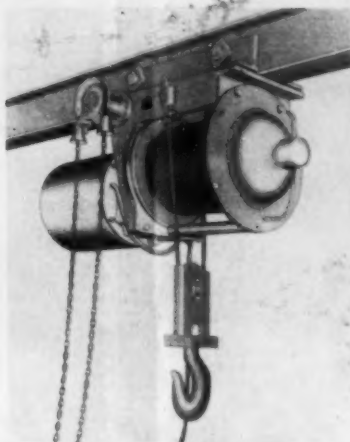
Extensive use of photos, diagrams and charts shows how the unit's range of speeds cuts minutes from the work cycle. The folder states reasons why the machine requires low maintenance and few repairs. Copies of Form 54-005-T may be obtained from the Advertising Department, LeTourneau-Westinghouse Company, Peoria, Illinois or by circling No. 69.



Wet-Type Dust and Fume Collector by Van-Truer

The Van-Truer Company has developed a wet-type dust and fume collector which is reportedly based on a new operating principle. The unit consists of a cylindrical drum with a series of cones and baffles. Water, supplied by a direct driven pump, cascades downward within the collector. This action produces a series of closely related water curtains through which the dust-laden air is filtered in its upward travel. It is claimed that the baffle design sets up a cyclonic

washing action and turbulence, separating the wet dust and carrying it to the sludge tank below. For complete details circle No. 64.



LeTourneau Offers New Series of Electric Hoists

A new series of 8 and 10-ton capacity electric hoists to handle heavy lifts in materials processing industries has been announced by R. G. LeTourneau, Inc., Longview, Texas.

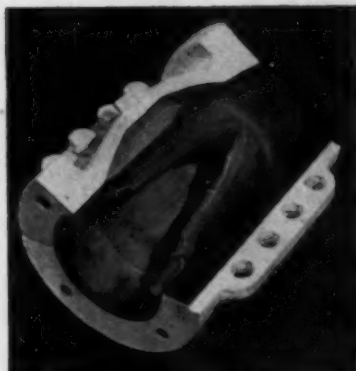
Headroom of the new 8 and 10-ton hoists is approximately 37-inches. The lift height is 15 feet and up. A choice of four mountings is offered—plain trolley, hand-gear trolley, motor-driven trolley, and lug mounting. For more information circle No. 62.



Speed and Horsepower of Traxcavator Increased

Increased horsepower and faster travel speeds are among the several improvements of the Traxcavator No. 6 Shovel announced by the Caterpillar Tractor Company. The bucket capacity has been enlarged to 24 cubic yards from its former 2 yard size. The engine now delivers 100 horsepower at the flywheel.

The No. 6 Shovel now has a two-position feature that allows maximum use of bucket capacity under normal conditions. Caterpillar reports that the speed has been increased almost 30 percent. A new hydraulic pump has boosted pressure in the hydraulic system to 1450 psi. The increased pressure provides greater lifting power for faster bucket action. Circle No. 71.



Control Valve for Solids

A new type of control valve for handling bulky materials and slurries such as coal cement, limestone, sand and metallic ores has been developed. The inner sleeve is made of pure gum rubber with reinforced multi-ply cords and will withstand abrasive wear due to the resilient characteristics of rubber. The valve body is cast iron. The valve can be operated either manually or pneumatically for on-off service or as a control valve. Air is put directly in the annular space between the rubber sleeve and the body to close the valve. It is available in sizes ranging from 1-inch to 24-inches from Red Jacket Investment Co. Circle No. 65.

Notes From The Manufacturers

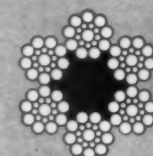
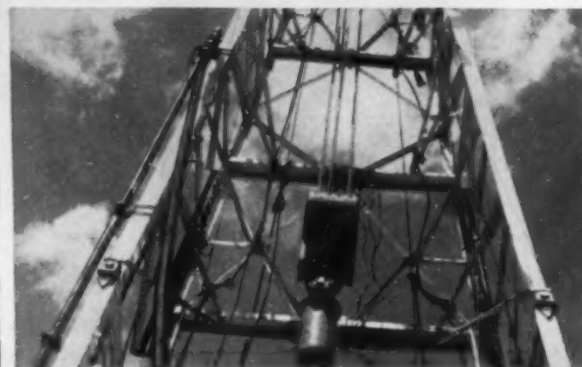
GLENN STROUD, J. T. Jenkins Company, is the manager of the firm's new branch office in Albuquerque, New Mexico. The firm is distributor for Kenworth trucks in California, Nevada, Arizona and New Mexico. Mr. Stroud has been with the firm since January 1954.

His past experience includes positions as transportation superintendent for the Husky Refining Company in Casper, Wyoming and Cummins engine distributor at Billings, Montana.

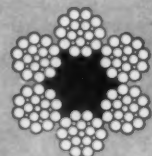


ROBERT J. LOSKILL, formerly sales development manager for Caterpillar Tractor Company, has been named managing director of a wholly-owned subsidiary in Sao Paulo, Brazil. The firm will be known as Caterpillar Brasil S.A. and will manufacture and sell bulldozers and scrapers plus parts for the company's entire line of products. Mr. Loskill, who has been with Caterpillar for 19 years, was sales development manager during the past year. Prior to that he was manager of sales training.

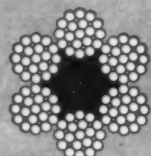




6 x 19 Seale rope has nine outer wires per strand.



6 x 21 rope has ten outer wires per strand.



6 x 19 Filler Wire has twelve outer wires per strand.

What can you do better with 6 x 21 Red-Strand wire rope?

What is 6 x 21 wire rope? It is sometimes called 6 x 16 Filler Wire. It is a construction of intermediate flexibility—between coarse 6 x 19 Seale and flexible 6 x 19 Filler Wire. 6 x 21 is a good choice where the operation includes abrasion and at the same time the rope is subjected to considerable bending. On certain types of duty the choice is vital to save time, effort and money.

When to use it? If, for example, your 6 x 19 Filler Wire rope is wearing out too soon because of abrasion, 6 x 21 with larger outer wires may provide much longer life. If severe bending is damaging your 6 x 19 Seale, a change to more flexible 6 x 21 may be profitable.

It is used on certain dragline jobs, vertical shaft hoists, drag and slackline scrapers, inclines, rotary and cable tool drilling rigs, and other equipment.

Can you use it to advantage? The best answer to that question comes from your Leschen technical man. Leschen representatives will help you get the most out of your wire rope. And with Hercules Red-Strand—as with all other Leschen wire rope, you are assured of *higher-than-rated quality for longer-than-expected service.*

See your Leschen man soon. He can easily be reached through your nearby Leschen distributor.

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HERCULES Red-Strand® WIRE ROPE



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LESCHEN WIRE ROPE DIVISION

The Watson-Stillman Company
(A SUBSIDIARY OF H. K. PORTER COMPANY, INC.)
St. Louis 12, Missouri



precipitates—ROCKY MOUNTAIN

Texas Co. & N.J. Zinc To Search for Uranium

The Texas Company and the New Jersey Zinc Company are undertaking joint exploration activities for uranium ore bodies in the Colorado Plateau and in other mineralized sections of the Western United States.

The exploration work is being conducted jointly; if deposits are found to warrant developing commercially, a separate company will be formed.

Utah Uranium Firms Start First Gismo Operations

First Gismo mining of uranium ores started in Utah in late January. Two units have been installed in the Big Indian district, the first by Standard Uranium Corporation for mining of ore in the 8° westerly dipping beds above the Frazer Tunnel. Ore is loaded and conveyed by the Gismo to the top of transfer raises above the tunnel. The unit is equipped with four drill-booms for drilling.

The second unit has been purchased by Utex Exploration Company for its Mi Vida mine. This is also a four-drill unit.

The Frazer is a new mine with all initial mining using slushers to pull muck to the raises. The Mi Vida has used several types of front-end, Diesel tractor loaders and Koehring Dumpsters for hauling. Open stoping with pillars is the mining method used at both mines.

Both Gismos were manufactured by Sanford-Day Iron Works at its Knoxville, Tennessee plant.

COLORADO

Capacity of the Vanadium Corporation of America mill at Naturita, Colorado, is expected to be increased by about 35 percent as a result of the expansion contract recently signed by VCA and the United States Atomic Energy Commission. An additional roaster and new leaching facilities will be added to the present facilities, making the mill one of the biggest producers of uranium concentrate in the United States. The new facilities will be in operation this Spring. Construction work is being done by the regular mill maintenance force.

Three Sprague and Henwood, Inc. diamond drill rigs moved into the upper Paradox Creek area late in December to begin drilling a group of claims for the Hunt Oil Company. The claims were leased by Hunt from the Riddle Brothers.

Crescent Uranium Mines, Inc., Denver, Colorado, made its first ore shipment in January. The ore came from the firm's Crescent claims on Outlaw Mesa in Montrose County, Colorado. Howard S. Chamlee is president of Crescent.

Basic Chemical Corporation has been formed in Colorado to process marble from the old marble quarries at Marble, Colorado, into lime. The rock, 99.5 percent CaCO_3 , will be taken from a 1,600-acre tract acquired from the Colorado

Yule Marble Company. It will be crushed at Marble, trucked to Carbon-dale, and then shipped to Glenwood Springs for furnacing. Carl Morris is president of the new firm, and C. J. Evans of Denver is vice president.

Run-of-the-mine ore shipments to the Climax Uranium Company mill at Grand Junction, Colorado have been started by Garth and Vance Thornburg from their Los Ochas group of claims in the Cochetopa mining district Saguache County, 22 miles southeast of Gunnison, Colorado. The 32 claims, leased by the brothers last August from a group of Colorado men for \$100,000 and a 15 percent royalty, showed assays from 0.30 to 15.49 percent U_3O_8 . The deposit is believed to be of hydrothermal origin. East and west limits of the ore body have not been defined. A 2,200-foot exploratory drift is being driven and surface drilling operations are being conducted by Minerals Engineering Company of Grand Junction. If the development proves successful, the Thornburgs are considering building a uranium processing mill at Gunnison. The brothers also have several uranium properties in Arizona.

Zodomok Mines, Inc., Durango, Colorado, reports that its 30-ton gravity mill will be ready for operation with the start of the 1955 season. The gold producing firm has a stockpile of ore at the present time and anticipates triple production in 1955. Selected high-grade shipments to Leadville during 1954 ran from 130

ounces to 176 ounces of gold per ton. D. M. DeLuche is superintendent of the Bessie G mine. Mill superintendent is Karle S. Goff.

Atomic Power Uranium Corporation, Denver, Colorado, has purchased 1,800 acres of patented land in Eagle County, Colorado, from Douglas McGoon, Grand Junction. Uranium shipments averaging from 0.3 to 0.6 percent U_3O_8 continue to be taken from the firm's Ford and Fordo claims on Tenderfoot Mesa in Mesa County at the rate of 17 to 20 tons per day.

Logs of core-drill holes on public lands recently opened for mineral entry are on display at the United States Geological Survey office in Grand Junction, Colorado. Now available for inspection are logs and index maps of holes drilled on a part of Atkinson Mesa in Montrose County. The logs show the type of rock penetrated and assay data on mineralized parts of the core. Maps give location of the holes for each group of logs. Logs and maps on holes drilled on Blue Mesa in Mesa County were released earlier by the survey.

Operation of the Cedar Claims in Colorado's Juniper Springs area, Moffat County, is being turned over to Nuclear Exploration Corporation, American subsidiary of Nuclear Explorations Limited, Canadian mining firm. The parent company has been carrying out preliminary work at the uranium property. A limited program of stripping and trenching was completed and several tons of ore sacked



Happy Jack Called Richest White Canyon Mine

This is how the fabulous Happy Jack mine in White Canyon, San Juan County, Utah looked in November 1953. Last month owners Joe Cooper and Fletcher and Grant Branson of Monticello, Utah, were busy denying rumors that the mine had been sold for \$16,000,000. An old-time copper mine, it was bought by Cooper and Branson several years ago and since then they have blocked out a very large deposit of primary uranium ore. The copper-uranium ore has been developed in a channel in the Shinarump formation. Activity to date has been centered on developing the ore body, and no attempt has been made to get into large-scale production. The ore was treated by the Vanadium Corporation of America pilot mill at nearby White Canyon until a year ago when the VCA plant closed down after the company and the United States Atomic Energy Commission were unable to come to an agreement over plans for a large mill. The AEC is now stockpiling the Happy Jack ore near the mine, and sampling is being done by the American Smelting and Refining Company at an AEC station which was established last October to handle the ever-increasing output at the mine. White Canyon, which extends about 60 miles southeast from its junction with the Colorado River in southeastern Utah, has attracted other uranium miners, and these mines are believed to be producing 30 to 40 tons of ore per day. These other producers include the Maybe mine, operated by McFarland and Hullinger of Tootle, Utah.

ROCKY MOUNTAIN

for future shipment. An intensive diamond drilling program will soon be carried out by the United States firm to outline the orebody.



Continental Uranium, Inc., Grand Junction, Colorado, is carrying out a long range drilling program on its School Section properties in Lisbon Valley, Utah. Four drills are now in the field, and additional ones will be brought in as work develops. In addition to its

20,000 acres and working mines, the firm has options on several other properties.

Uranium-vanadium ores have been discovered by *Consolidated Uranium Mines, Inc.*, Salt Lake City, Utah, at Carpenter Ridge, Outlaw Mesa, Mineral Mountain, Colorado and the Circle Cliff district in Utah, and additional ore zones are being developed by the firm at its Temple Mountain, Utah property. Net income for the fiscal year ended July 31, 1954 was reported as \$115,491. The firm's *Linka* tungsten prospects in Lander County, Nevada are expected to be in production early this year.

A 25 percent interest in the nine-claim *Phoenix* uranium prospect on the northwest flank of Big Indian Wash, San Juan County, Utah has been acquired by

Western Silver-Lead Corporation. Only low-grade mineralization has been found in 7,000 feet of drilling on the *Juanita* lease, Yellow Cat area, Grand County, in which *Square Deal Mining Company*, Wallace, Idaho has a half interest.

E. J. Longyear Company has begun a lead-silver-zinc exploration project on Chief *Consolidated Mining Company's* *Homansville* claims at Eureka, Utah. One core drill hole has been completed to a depth of 1,069 feet. Objective is ore deposition in a synclinal structure similar to that exploited in the past in the nearby *Tintic Standard* property.

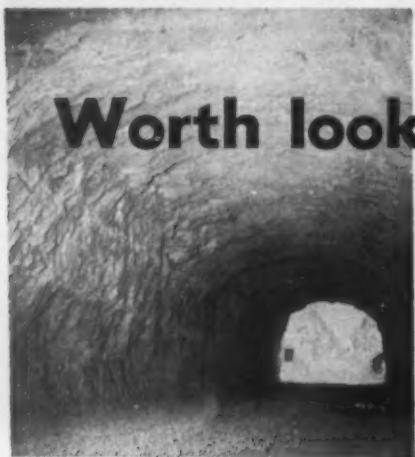
New Idria Mining and Chemical Company, California mercury producer, has signed a contract with the Navajo Tribal Council for uranium mining rights on 40 acres of tribal land in Monument Valley, Utah. A surface outcropping of uranium ore will be explored by tunneling and the contract for the work has already been signed. The mine is called *Monument No. 3* and is on a site recently relinquished by the *Vanadium Corporation of America*, which had exceeded the maximum acreage allowed on the reservation by the Federal government.

Western Phosphates, Inc. plans a 50 percent increase in production of treble superphosphates and ammonium phosphates from its Garfield, Utah fertilizer plant. Capacity of the phosphoric acid production department will be doubled and substantial increase in requirements for phosphate rock produced in Utah, Idaho, and western Wyoming is expected. John Paul Jones is general manager of the firm.

A new corporation, *The American Energy Corporation*, has been formed to develop uranium holdings in Utah's Cane Springs area. The California group has purchased 48 claims 15 miles south of Moab. Victor J. Nelson, Glendale, California architect-engineer, heads the group. Consulting geologist is William Owen of Moab. The firm expects to conduct core drilling and drifting with lateral drilling. Excellent surface showings have reportedly been found. Values are in the *Shinarump* and *Chinle* formations.

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WYOMING

The American Smelting and Refining Company is operating the new United States Atomic Energy Commission ore buying station at Riverton, Wyoming, which was completed early in January. The installation, first such station in Wyoming, was built by the *Walker-Lyburger Construction Company* at a cost of \$135,000.

A. E. Mills, Casper, Wyoming will start strip mining next summer on 1,600 acres of phosphate rock leases which he has purchased. The properties are located in western Wyoming near the Idaho state line.

The Wind River Indian Reservation southeast of Riverton, Wyoming was the site of 28 claims which were filed in Lander, Wyoming during November. The notices were recorded by Anthony Zulli as the *Riverton Uranium* claims.

Virginia Grants Mineral Leases to Chesapeake Co.

A five-year lease permitting extraction of minerals has been granted to Sidney S. Alderman, Jr. of the Chesapeake Exploration Company, by the state of Virginia. The lease covers two tideland areas totaling 47,000 acres near the mouth of the Chesapeake Bay between Cape Charles and Old Point Comfort. It gives Mr. Alderman permission to drill for ilmenite, rutile, zirconium, diatomaceous earth, and "other minerals," excluding gas and oil; it also permits commercial extraction of minerals by dredging or other means. In return, the state is to receive a royalty of 10 percent on the net profits from minerals sales.

Other particulars require that Mr. Alderman exercise "reasonable diligence to insure that there will be no interference with the seafood industry," and that quarterly reports be filed with the conservation department detailing progress of drilling. The drilling must conform to regulations and have the approval of the Corps of Engineers, the United States Navy, the Coast Guard, and the Defense Department.

The leases were applied for on the basis of results of a drilling program carried out by the group in 1954 under a Prospecting Mineral Lease and Permit granted by the state of Virginia in August 1954. The largest drilling now expected to take place is on a 25,000-acre site described as "shaped like a huge button shoe"; the other will occur on a diamond-shaped 22,000-acre site.



Calumet & Hecla, Inc. has offered to buy the property of its subsidiary, the Cliff Mining Company. The price reportedly would result in a distribution of about \$2.50 per share for minority stockholders. A stockholders meeting has been called to decide upon the offer.

William Frost of Clintonville, Wisconsin claims discovery of the first uranium in Wisconsin. His find, reportedly in a layer of sedimentary rock, is near Big Falls in Waupaca County. He plans to drill for ore samples.



As of December 10, 1954, government buying of strategic mica at the United States Purchasing Depot in Spruce Pine, North Carolina was at the rate of just under \$3,000,000 a year. Average price paid during the year up to that date was \$13.44 per pound. Ruby mica brought an average of \$13.35 and non-ruby \$13.60. About 85 percent of the mica bought at Spruce Pine is from North Carolina mines, and a large part of that from the

Spruce Pine district. Some mica is brought into the district in the block form for preparation by local experts. As much as 45 tons has been brought in from Maine.

Iron ore production is expected from the Bethlehem Cornwall Corporation (subsidiary of Bethlehem Steel Company) operations near Morgantown, Pennsylvania late in 1957. Full-scale production from the \$34,000,000 operation is scheduled for some time in 1960. Work on the two Morgantown shafts, one now 1,600 feet deep and the other 1,200 feet deep, was started in 1951 and expected to be completed in two years. However, heavy water inflows and other adverse conditions have lengthened the construction period by another two years. When ready for operation, the shafts will be 3,000 feet deep, concrete-lined, and equipped with elevator and ventilation facilities. Approximately 12,000 tons of crude ore will be hoisted every day when in full production.



The surface plant has been completed at the Cannon iron mine of the M. A. Hanna Company at Stambaugh, Michigan and shaft sinking is nearing its objective of 1,700 feet.

Foundations for Pickands Mather & Co.'s new HMS addition to the Danube mine were completed last December. The plant will be erected and ready for operation by the start of the 1955 season.

At Pickands Mather's Bennett mine, concrete work has been finished on the new HMS and cyclone plant. The primary crushing section is nearing completion and work is going ahead on the plant itself. This plant is also scheduled for operation at the start of the spring season.

The 1954 shipping season for Lake Superior District iron ore ended in December with a total movement for the year of 60,793,697 gross tons. This compares with 95,844,449 tons in 1953. The high tonnage figure for 1953 plus slackened demand for steel during the second and third quarters were the primary causes of the small movement this year. Foreign ore imports also played a small part in the reduced shipments from this area. The recent increase in operations in the steel mills has created an optimistic outlook for the coming season and shipments for 1955 are expected to be well above 1954.

The W. S. Moore Company has started stripping and preparation of the railroad bed for the new O'Brien mine between Nashauk and Keewauwin, Minnesota. First shipments are scheduled for 1956.

Employees of all Oliver Iron Mining Division, United States Steel Corporation, operations on the Mesabi Range and at Ironwood, Michigan returned to a five-day, 40-hour work week on January 3. The new schedule replaces the four-day, 32-hour week which had been in effect at these operations since October. The division has also recalled 440 miners equally divided between the Hibbing-Chisholm district and the Virginia-Eveleth operations who had been on lay-off status, and hopes to increase its work force when the ore shipping season opens in the spring.



Lithium Corp. Opens New Bessemer City Plant

This is an air view of Lithium Corporation of America's new plant at Bessemer City, North Carolina. Taken when the plant was 80 percent completed, it went into operation last month. The crushing circuit is located in the lower right, the stockpile conveyor and kiln in the lower right center, followed by the cooler, ore storage silos, and roaster. The processing plant is at the left. A unique feature of this operation is the elimination of the ore concentrating step; the plant will process run-of-the-mine ore directly through the chemical plant. Spodumene ore will come from the company's extensive deposit at nearby King's Mountain. Mining operations are ahead of schedule and an 80,000-ton stockpile, mined by open pitting, is ready for processing. Equipment, all specially designed, includes a 250-foot-long roasting kiln with an 11-foot interior diameter. A completely equipped laboratory for analytical and chemical control is also being constructed. The plant is part of a \$7,000,000 expansion project.

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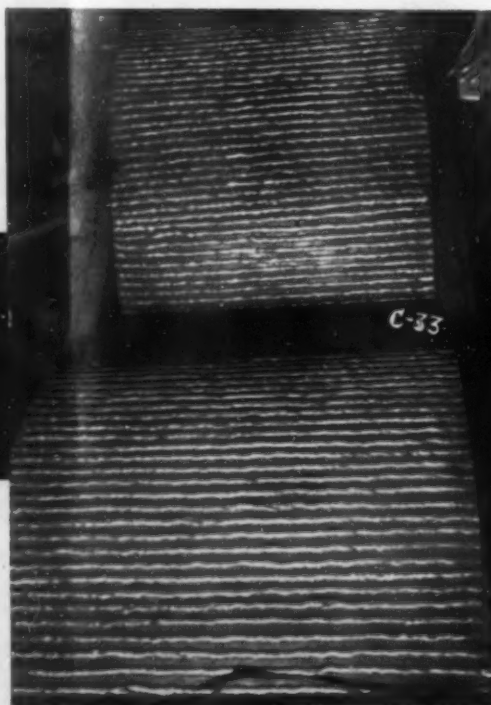
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Gold Zone Will Develop New Mercury Property

The Gold Zone Mining Corporation of San Francisco has begun development of its newly acquired properties in the western Mayamacas quicksilver district of Sonoma County, California.

The properties lie between the old Cloverdale and Culver Baer mines now the property of Buckman Mines. The Mayamacas district has been one of the largest quicksilver producing districts in the state.

Development by bulldozing and opening up of several well mineralized areas is under way. More extensive sampling will then be undertaken and proper determination made of the most favorable place to start operations. The necessary money for installation of machinery and equipment has already been provided.

Phelps Dodge Promotes Two Western Officials

Phelps Dodge Corporation has made some major changes in its western management. On January 1, Charles R. Kuzell became vice president in charge of western activities, and Walter C. Lawson was named general manager in charge of western operations. The offices of both men will continue at Douglas, Arizona, where they have been general manager and assistant general manager, respectively.

Mr. Kuzell has served as general manager of Phelps Dodge since March 1, 1952. He came to Douglas from Clarkdale in February 1944 as consulting metallurgist and director of labor relations, and January 1, 1946 was promoted to assistant general manager. A graduate of the Case School of Applied Science, he was engaged in metallurgical work for Anaconda Copper Mining Company in Montana for eight years before joining the staff of the United Verde Copper Company at Clarkdale in 1918. He was general superintendent of United Verde at the time it was acquired by Phelps Dodge and later served as manager of the United Verde Branch. For a short period in 1940, he was manager of the New Cornelia Branch at Ajo.

Mr. Lawson, the new general manager, has been assistant general manager since March 1, 1952. He entered Phelps Dodge employment as a mining engineer at Ajo in 1926. In 1937, he was transferred to the Morenci Branch as chief mine engineer when development of the Morenci open-pit mine was initiated. He became mine superintendent at Morenci in 1942, and was promoted to the position of general superintendent on January 1, 1946. In 1948, Mr. Lawson was named manager of the New Cornelia Branch and served there until advanced to the general offices in Douglas on July 1, 1951. He is a graduate of Michigan School of Mines.

office in Arizona during December, following various low-grade uranium strikes in Santa Cruz and Pima counties.

The Morrow Mining Associates are starting operations on a lithium mine, 12 miles north of Morristown, Arizona. Denzil Morrow of Wichita Falls, Texas is in charge of operations. Production will be marketed through American Lithium Company. The Morrow Mining Associates are Texas oil people.

Nearing its final stages is the \$8,000,000 railroad project in the San Pedro Valley of Arizona where more than 36 miles of new line are being laid from the Red Hill mine of San Manuel Copper Corporation, to the mill and smelter site at San Manuel, and then on to Hayden, Arizona. Here the San Manuel-Arizona Railroad Company line will connect with the Southern Pacific Railway to permit shipments via Kelvin, Florence, and Mesa to Phoenix. San Manuel, a wholly owned subsidiary of Magma Copper Company, expects to produce about 140,000,000 pounds of copper and 6,000,000 pounds of molybdenum annually when in full production by 1957 or 1958.

Capitol Uranium Company, of Farmington, New Mexico reports that it has made 16 shipments of uranium ore from its Carrizo Mountain property in Apache County, Arizona. The United States Atomic Energy Commission is said to be core drilling on Capitol's Lukachukai Mountain property, also in Apache County.

The Sierra Ancha Uranium Corporation, Globe, Arizona has announced the leasing of 64 uranium claims in the Sierra Ancha area of Gila county. Negotiations were handled by Ramon Bowman, president, and Charles Howard, secretary. The claims were leased in four different groups from the various owners.

In all cases the deal was said to involve cash payments and royalty guarantees, and a minimum amount of exploration and development.

The International Ore Corporation, D. W. Simpson, president and general manager, is unwatering the old Monte Cristo gold-silver-copper mine, 16 miles east of Wickenburg, Arizona, for the purpose of sampling and exploration. Four men are employed.

The Papago Indians are reported to be concerned over the uranium boom because they are the only tribe which does not have mineral rights on its own reservation (Arizona). Because of various riders on Indian Affairs bills since the land was first deeded to the tribe by President Woodrow Wilson, prospectors can stake claims and mine them if they prove minerals are contained there.

Universal Uranium and Milling Corporation has purchased 300 uranium claims near Marble Canyon, Arizona from the United Development Company for \$255,000. Universal plans to begin open-pit operations immediately.



Anaconda Copper Mining Company has reopened its Darwin lead-zinc mine and mill at Darwin, California, after an 11-month shutdown. For six weeks prior to the complete reopening, two development crews had been working on a ven-



Open-Pit Mining for Siskon Gold Ore

The Siskon Corporation, operating on the south fork of Dillon Creek in Siskiyou County, California, made 20 shipments of gold and silver bullion to the San Francisco Mint this season (up to September 15). Gross value was about \$313,000. Development work this year has been concentrated at an appreciable depth below the present Tennessee open pit. An adit is being driven toward the projected downward extension of this ore body and also the firm is exploring for it with a diamond drill. The firm has acquired the Gray Eagle mine which is reported to have produced and milled approximately 465,000 tons of copper ore during World War II, from which was recovered about 63 pounds of copper per ton of ore treated. However, the management says that it was not the copper ore body that attracted the attention of Siskon. It is believed that a substantial amount of gold ore is on the property which would be amenable to open pit mining. The same methods would be used as at the Siskon, shown above, where a Caterpillar Diesel 6 shovel is loading ore into trucks for transportation to the cyanide mill.

An estimated 300 mining claims were filed in the Santa Cruz County recorder's

tilation shaft and on a downward continuation of an incline shaft to supplement the hoisting of ore and waste in a vertical shaft from lower levels. (See MINING WORLD, January 1955, page 83.)

A uranium strike has been reported in the Coxcomb Mountains east of India, California and over 2,800 claims have already been staked by 141 separate claimants. The original discovery was made by John Salmon of Sunland.

Ben Kenney of North Hollywood, California reports the discovery of uranium on the outskirts of San Fernando, about 25 miles from Los Angeles. He has staked claims in the area.

The Natomas Company operated five dredges continuously in the Folsom district of California during the year ended September 30, 1954, and a sixth dredge for a period of 53 days before it sank. Gross production has decreased in this district only five percent since 1952, despite a 15 percent reduction in the number of operating dredges. Unit operating costs for the year were maintained at approximately the 1953 level. The Greenan Placers operation in Nevada showed improvement over 1953 production and resulted in a small net profit before depreciation, as compared with a loss in the previous year. Combined operations in California and Nevada re-

sulted in the handling of 25,067,374 cubic yards of gravel, representing a 3.6 percent monthly decrease from the previous fiscal year. Gross production was \$2,787,310.10, about equal to 1953 on a monthly basis.

In Inyo County, California, Ray Lawrence of Lone Pine is working on a 150-foot drift into the side of a hill overlooking Death Valley. Assays of surface mineral samples showed a uranium content of 0.07 percent U_3O_8 , and Mr. Lawrence believes that the grade will improve with depth. He had been mining the eight claims for nepheline syenite and amphibole asbestos when he discovered the uranium ore. The deposit appears to be a chimney. The outcrop is approximately 350 feet long and holds a width of 50 feet. It is walled with nepheline syenite. Because of the terrain, it is possible to develop as an open pit.

Hottah Lake Uraniams, Ltd. of Vancouver, British Columbia, Canada has entered into an agreement with Frank Eichelberger, consulting mining engineer of Spokane, Washington, and associates, acting for an unnamed California mining company. The agreement provides for a geological survey and exploration work, together with the right to then proceed with ore development. Hottah would retain 40 percent of net profits. A two-month diamond drilling program early this year by the company confirmed that uranium deposition persisted to depth.



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The Goldfield Consolidated Mines Company is making repairs to its Laguna shaft at Goldfield, Nevada. All skids will be replaced down to the 450 level, and later the 600 level. The 150-horsepower, counterbalanced electric hoist also will be repaired. The Laguna, together with a 600-foot-square lease block on the Red Top and Consolidated Red Top mines will be used primarily to penetrate the Columbia Mountain fault. The existing workings on the 450-foot level to be opened up and retimbered will leave only 100 feet to go in order to enter the fault. It is planned to contract a 1,500-foot drift with crosscuts to connect all of the existing ore bodies now exposed on Columbia Mountain.

Cecil B. Hanson and Kenneth F. Hanson have optioned their Little Red Head group of uranium claims near Yerington, Nevada to the Capitol Reef Mining Corporation of Van Nuys, California. The claims will be prospected by diamond drilling for four months before the first payment will be made.

Work has started on deepening of the present shaft for lateral development at the Josefa claims at McDermitt, Nevada. Jay A. Carpenter, former director of the Mackay School of Mines and the Nevada Bureau of Mines, together with Santiago Guridi and J. P. Hart, leased the property, and then interested the United States Mercury Corporation of New York in operating it. Mr. Carpenter has been appointed manager to search for additional mercury properties, while Mr. Hart takes over as mine superintendent. The claims were originally located by Mr.

Guridi and Jovina Ugarizza in 1930. Mr. Ugarizza died, and his interest went to three nieces. Mr. Guridi kept up assessment work over the years and developed showings of mercury ore in two shallow shafts 25 and 50 feet deep. Current plans also call for trenching by bulldozers, followed by geophysical work and churn drilling.

A small metallurgical test laboratory has been set up at the *Three Kids* property of *Manganese, Inc.* in Henderson, Nevada. Equipped to handle almost any kind of test work, tests are now being run to perfect a process to produce high-grade synthetic scheelite out of a mixture of huberite and scheelite. This is a middling product from the *Tungsten Mining Corporation's* operations at Henderson, North Carolina. So far the work has yielded a product assaying above 70 percent WO_3 with high metallurgical recovery. In charge of the lab is John P. Lowe, field engineer for *Haile Mines, Inc.*, parent company of both *Manganese Inc.* and *Tungsten Mining*.

The old *Alabama* gold mine in the Awakening district about 40 miles from Winnemucca, Nevada has been acquired by Harry A. Simons and associates of New York. They plan to construct a new mill designed to handle 250 tons per day.

The titanium research program has been reactivated at the U.S. Bureau of Mines laboratory in Boulder City, Nevada, by order of the Secretary of the Interior. The program had been dropped last September when the original contract for the process was completed; now it is felt that further refinements are necessary in the technique of the process and it is for this reason that the laboratory will be reopened.



The United States Atomic Energy Commission recently called for bids on 25,000 feet of non-core rotary drilling within the Sanatee area of San Juan County, New Mexico to test sedimentary and ore trends.

A new hoisting record was made on November 20 by the *International Minerals & Chemical Corporation's* Potash Division at Carlsbad, New Mexico when a total of 11,906 tons were

hoisted; this was 52 tons over the previous record made in February 1954. Production throughout the month of November was on a high level with an average of 10,433 tons hoisted daily. This was also a new record for the plant.

The largest number of placer prospecting uranium claims ever issued on state land went to Dr. Waldemere Benar, geologist at New Mexico Institute of Mining & Technology at Socorro, New Mexico. He has received 1,078 permits totaling \$25,460 for one year. The permits allow him exclusive mineral prospecting rights on state land for one year. The land is located in Santa Fe, San Miguel, Guadalupe, Harding, Chaves, DeBaca, Quay, Torrance, and Curry counties.

The newly formed *Frontier Uranium Company* of Gallup, New Mexico has started shipments of uranium from its properties in the Hogback-Pinedale district. Most of the mining is tunnel development with some strip mining. The largest mine is to be operated at a depth of 180 feet. The property was originally held by Glen Williams and Henry Reynolds as a partnership. The new firm was formed by Mr. Reynolds,

together with Harlee Townsend and Mattie Pousna. They are now president, vice president, and secretary-treasurer, respectively. Mr. Williams is a stockholder in the new firm.

An exploration and development program is being planned by *Atiminas, Inc.* including aerial surveying and core drilling. The firm is already mining uranium in Grant County and torbernite at White Signal near Silver City, New Mexico. Also preparing to start field explorations for uranium is *Pubco Development Company* of Albuquerque. The firm has established a special department to conduct uranium exploration and development work. A 52,000-acre section is being explored in the Gallup-Grants region under an agreement with *Bolack Oil & Gas Company* of Farmington which holds prospecting permits on the land.

The *United States Smelting, Refining & Mining Company* has filed application with the United States Land Office for a patent on a group of claims in the Central mining district of New Mexico. Included in the group are the *Diorite* claims adjoining already extensive holdings of the company. J. T. Lewis, Jr. of Bayard is listed as agent for the firm.

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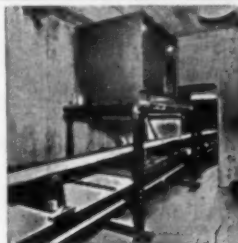
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Summary of 1954 Western Mineral Production Shows Uranium Up, Lead-Zinc Still Down

Arizona's copper production declined during 1954 due to strikes and curtailment of operations by several large producers. The decrease in production would have been greater if it had not been for production from three new open pits; Copper Cities near Globe, Lavender at Bisbee, and Silver Bell at Silver Bell. In 1954 Arizona produced more manganese ore than in any prior year. Tungsten production declined to about 13 percent below that of 1953. Some mercury was produced during 1954, the first since 1951. Also, a substantial amount of uranium ore was produced.

In California silver production took a sharp drop due to the fact that Anaconda Copper Mining Company operated its Darwin mines approximately only two months of the year. Activity in tungsten and mercury increased.

Molybdenum production in Colorado increased from 37,306,000 pounds in 1953 to 44,000,000 pounds in 1954; the largest production since 1943. The booming activity in uranium continued throughout 1954.

Idaho's zinc production dropped to the lowest point in 15 years in 1954. Phosphate mining and processing continued to expand. Estimated mined phosphate rock in 1954 exceeds the 1,000,000 long ton record of 1953.

Mine production of copper in Montana dropped about 23 percent below that of 1953. The main cause of this was a 53-day strike at Anaconda's Butte mines. Production of gold, silver, lead, and zinc also dropped due to this strike. Output of tungsten ores and concentrates increased considerably. This was largely due to the operations of Minerals Engineering Company at Glenn.

Production of copper in Nevada increased over that of 1953 and Nevada became third largest producer. The increase was due to Anaconda's new mine at Weed Heights.

Potash production in New Mexico increased about five percent over that of 1953. Output of crude perlite also in-

creased, while production of pumice decreased. The greatest interest was in uranium with an increase in exploration and mining of this metal.

In Oregon shipments of chrome ores and concentrates to the government stockpile depot at Grants Pass rose sharply over that of 1953. Interest increased in mercury near the end of the year, but the 1954 production of this metal is estimated to be about 20 percent below that of 1953.

Production of ferronickel began about the middle of 1954 by the Hanna Coal and Ore Company at their operations near Riddle.

Copper production in Utah dropped due to strikes. Output of gold, molybdenum, and silver also decreased because they are byproducts of the copper ore. Surprised increases occurred in the production of lead, zinc, and phosphate rock. The uranium boom continued with production at an all time high.

Aluminum output from reduction plants in Washington increased about eight percent over that of 1953. Interest in uranium centered around a discovery made on the Spokane Indian reservation.

Decreases in the production of iron ore, bentonite, and phosphate rock occurred in Wyoming during 1954 as compared to 1953. Mining and prospecting for uranium was once again one of the main activities.

Spokane Reservation Ships First Northwest Uranium

The uranium fever has hit the Spokane, Washington area, following shipment of Washington state's first uranium ore from the Spokane Indian Reservation and a scramble to acquire leases on state lands bordering the reservation. At last report, no returns had been received from the shipment and average grade of the autunite-torbernite ore had not been determined. Chemical assays, however, showed up to 0.48 percent uranium oxide.

Twelve-ton truckloads were hauled some 60 miles to Spokane from the property of Midnight Mines Company, owned by members of the Spokane Indian tribe. Under a shipping contract with the U.S. Atomic Energy Commission, the ore was to be processed in Salt Lake City. Several hundred tons of ore were blasted and bulldozed from the surface deposit in initial prospecting operations. At the time of the initial shipment, the AEC had just started diamond drilling beneath the surface showing which occurs along a granite-argillite contact.

The leasing rush resulted from disclosure that Douglas, Arizona, residents, some of them officials of Phelps Dodge Corporation, had applied for state leases on nearly 3,000 acres just north of the reservation. Only a limited amount of land near the reservation is available for claim staking and this is in rugged mountains now snowbound. Prospecting is virtually out of the question until spring.



In the New Purim area of the Silver Belt, Coeur d'Alene mining region, Shoshone County, Idaho, *Polaris Mining Company* and *Silver Dollar Mining Company* are developing two parallel veins containing irregular shoots of silver-copper ore. Two development headings are being run upwards from the 3000 level. One of the veins has been prepared for stoping at the 3200 level. Now nearing the area is a 3400-level bore from the adjoining *Silver Summit* mine owned by Polaris. Purim ground between the Yankee Girl vein and the Chester vein is being diamond drilled. L. J. Randall, Wallace, is president of Polaris; Elmer E. Johnston, Spokane, heads Silver Dollar.

Crosscutting toward the vein objective at the *Vindicator Silver-Lead Mining Company* property east of Mullan, Shoshone County, Idaho, recently got under way from the 750-foot level of a new shaft. At last report, work was on a two-shift, six-day-week basis. The lead-zinc exploration project is being carried out by *Silver Buckle Mining Company* of Wallace under a contract with the Defense Minerals Exploration Administration.

The new tungsten upgrading plant of *Mineral Recovery and Engineering Company* at Osburn, Idaho went into operation in the first week of October and by year's end had received more than 284 units of WO_3 concentrate from western Montana, Idaho, and Washington producers. The upgrading plant now consists of the following facilities: tabling, hydrosizing, grinding, crushing, and flotation. Magnetic separation and hydrometallurgical procedures are planned for the coming season. The operation was designed by Paul H. Floyd, metallurgical engineer, who formed the firm. Initially it was for upgrading of tungsten off-grade concentrate and cobbed ore; however, expansion into other specialized fields of ore dressing is planned.

Production and Dollar Value of Gold, Silver, Copper, Lead, and Zinc Produced in the Western States During 1953¹ and 1954²

State		Gold Ounces	Silver Ounces	Copper Tons	Lead Tons	Zinc Tons	Dollar Value
Arizona	1953	112,824	4,351,429	393,525	9,428	27,530	\$242,572,489
	1954	113,500	4,335,000	378,500	8,900	21,750	239,974,194
California	1953	234,591	1,036,372	382	8,664	5,358	12,870,230
	1954	235,386	308,072	340	2,330	1,913	9,642,727
Colorado	1953	119,218	2,200,000	2,941	21,754	37,809	22,247,782
	1954	95,000	3,400,000	4,400	17,700	34,750	21,544,672
Idaho	1953	2,376	13,636,680	2,100	69,885	68,650	47,729,814
	1954	1,700	14,812,730	2,550	63,320	37,350	44,918,889
Montana	1953	24,768	6,689,556	77,617	19,949	80,271	75,162,392
	1954	22,440	5,124,600	59,800	14,738	61,142	58,526,882
Nevada	1953	101,799	697,086	61,850	4,371	5,812	42,177,725
	1954	78,339	588,880	71,630	3,440	1,150	47,014,031
New Mexico	1953	2,614	205,309	73,477	2,943	13,373	45,725,959
	1954	3,500	107,800	60,380	870	7	36,323,978
Oregon	1953	8,250	6,990	—	—	—	295,022
	1954	6,540	14,260	4	6	—	245,814
Utah	1953	483,430	6,725,807	269,496	41,522	29,184	195,289,033
	1954	407,000	5,975,000	211,300	43,700	32,300	164,221,877
Washington	1953	62,560	321,202	3,740	11,064	32,786	15,066,612
	1954	66,600	313,900	3,600	10,040	21,800	12,323,975
Wyoming	1953	1	11	1	—	—	619
	1954	181	87	1	—	—	6,981

¹ Final.

² Estimated by the U.S. Bureau of Mines.

Articles of incorporation were filed at Boise for *Golden Nugget Mines and Mills Inc.* of Fairfield, Idaho with \$500,000 capital stock. Incorporators were Henry T. Furrow and Mildred Robinson of Fairfield and V. W. Goodwin, John Junkert and R. L. Van Houten of Gooding.

H. G. Loop of Spokane, Washington has been elected president and managing director of *Clearwater Mines, Inc.*, which is developing 18 claims in southeastern Shoshone County, Idaho near the Montana boundary. Work has been shut down for the winter. Plans for next spring include connecting the mine access road with a new logging road built into the area by *Diamond Match Company*. This would permit year-round operations. E. I. Fisher is secretary-treasurer.

Great Northern Uranium Mines Company has been organized to re-work old gold placer gravels in the Elk City area of Idaho. The firm has purchased or leased 1,040 acres of placer gravels in the Ten Mile, Newsome Creek, South Fork, Crooked River, and Santiam mining districts, and hopes to recover monazite, samarskite, zircon, ilmenite, garnet, and gold. Installation of a dragline and washing plant are planned upon completion of current sampling. A magnetic separation mill may be built next summer. Company office will be in Grangeville. G. C. Waddell is president.

Recently discovered surface exposures of fluorspar in the old Bayhorse silver district near Challis, Idaho suggest that the district may contain the most important concentration of the mineral in Idaho, the State Bureau of Mines and Geology has reported. Because of the potential importance of the discoveries, the bureau issued a preliminary report on the area before its field study was completed. The report includes data on *J. R. Simplot Company's Chalspar* property, and the *Keystone, Holderman and Pacific*.

Uranium Exploration Corporation of Idaho, with \$100,000 capitalization, has been incorporated by Bert Sweet Sr., Bert Sweet Jr., Richard C. Sweet, Leonard V. Mauss, Emmett E. Kelly, Robert W. Stephan, Roy Henderson, J. M. Norfleet, Lowell Kinney, Harry Harris, Truman Grenhalgh and Warren J. Larsen, all of Twin Falls; L. F. Heagle, Hailey; Charles C. Haight, Burley, and Lawrence R. Severe, Gooding.

Lewis-Clark Uranium Company, Kamiah, Idaho has been incorporated for \$50,000 by James Danielson, Kamiah, and O. R. Schuchert and Roy L. Sullivan, Orofino.

Echo Bay Lead-Silver Mines, Inc. plans to resume development work at its property at the south end of Pend Oreille Lake, Idaho on the basis of a favorable geophysical survey by Francis W. Russell, Sunnyside, Washington. E. C. Schaeffer of Wallace is president and manager.

MONTANA

The Northern Mining Company has done considerable bulldozing on the *Hawkeye* claim, five miles northeast of Landusky, Montana, uncovering and exposing a gold-bearing vein. Operations

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on this claim have been suspended for the winter, but more work is contemplated in the spring. Also being considered is the possibility of erecting a small mill. Paul Raber is president of the firm.

Henry Heppner and son plan to extend a drift and to do some more surface work on their gold-silver property, located four miles east of Landusky, Montana, this winter. The vein has been traced for a considerable distance on surface and the drift extension is for the purpose of evaluating the vein at depth.

The *Ivanhoe* (formerly *Brown's Lake*) tungsten mine of *American Alloy Metals, Inc.* in Beaverhead County, Montana has been purchased by *Minerals Engineering Company* of Grand Junction, Colorado,

along with all stock of the company. The Colorado firm has been operating the property under lease and profit-sharing agreement. Open-pit methods are in use, with ore reserves estimated at more than 800,000 tons. Capacity of Minerals Engineering company's concentrator at Glen, Montana is being enlarged. Blair Burwell is company president. *American Alloy Metals* was organized by A. E. Eichelberger, Spokane mining engineer, and A. E. Julian, San Francisco, vice president of *Goldfield Consolidated Mines Co.*

Mountain States Mining Company of Roundup, Montana has been incorporated for \$200,000. Directors are Jack J. Boyle, Walter J. Johnson, and Edwin R. Nicholson.



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The Bon Terre Corporation, a recently incorporated Washington mining firm, is developing a tungsten showing in Granite County, Montana. The ore is milled at Hall, Montana. Initial production is about 50 tons daily. R. R. Gibson of Spokane is president and general manager.



American Smelting and Refining Company, at last report, still was running its Van Stone flotation mill in Stevens County, Washington at about 30,000-ton-a-month capacity despite fulfillment of a government contract under which it was receiving 15¢ cents a pound for zinc. However, at the prevailing 11¢-cent price the operation was marginal. It was being kept in operation in the hope of further improvement in the zinc price. Full-scale production of the \$2,000,000 plant began in March 1953, under a contract guaranteeing a 15¢-cent-a-pound floor for 36,872,000 pounds of zinc produced in the first three years of operation or until earnings reached \$683,000. About 30,000 tons of waste is being stripped monthly from the ore deposit. About 70 are employed. J. E. Berg of Wallace, Idaho is general manager of AS&R's northwestern mining department. P. A. Lewis is Van Stone superintendent.

Penticton Tungsten Mines, Ltd. is installing machinery at its Germania mine-mill in southwestern Stevens County, Washington to raise capacity to 400 tons daily from the present 300 tons. Milling was halted early in the winter by freezing of ponds supplying water, but two shipments of concentrates were made before the freeze-up. The initial shipment of 2½ tons graded better than 63 percent tungsten trioxide. Ore is mined by open-pitting above the main adit of the old Germania mine. Frank Eichelberger of Spokane is company president, and Wellman Clark, secretary-treasurer.

The Grandview mine in the Meteline Falls zinc-lead district of Pend Oreille County, Washington has been reopened after a strike which lasted almost five months. The terms finally agreed upon are said to be practically the same as those current in the Wallace-Kellogg, Idaho district. Among the benefits employees will receive is a five percent wage increase over the scale of July 1, 1954 when negotiations started. The mine is operated by the American Zinc, Lead and Smelting Company under a lease from Grandview Mines of Spokane. Development crews will be on a six-day week for several months.

Ore has been found in two long-abandoned mines in Okanogan County's Conconully mining district, Washington. The operating company is Conconully Mines, Inc., organized by A. E. Kaiser, Yakima mining engineer, and associates less than two years ago. At the Mohawk mine, leased from Sunny Peak Mining Company of Spokane, the firm bulldozed a road to the portal to eliminate an 800-foot tramway. It moved the mine plant up to the portal, and discovered a four-foot vein of shipping grade silver-copper ore by tunneling a short distance into a sheer zone from the old adit. A winze is being put down on the ore. At the Peacock mine, leased from William Hunter of Electric City, a tunnel extension has opened a shoot of good milling grade silver-copper ore. Ore from both mines has been test-milled in a flotation plant at Omak, leased from American Graphite Company, and a test shipment of concentrates made to the Kellogg, Idaho smelter.

Addy Development Company of Kellogg, Idaho, is developing Addy Mining Company's tungsten mine west of Addy, Stevens County, Washington under lease and purchase option. Plans call for a three-compartment raise on an ore shoot from the main adit up 110 feet to old workings. If ore reserves justify, a small treatment plant may be installed next spring. Paul H. Floyd and Frank Birch have the lease. R. J. Weller of Spokane heads Addy Mining Company.

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- 1-220 CFM Gardner-Denver. 8" x 4 1/2" x 5"
- 1-447 CFM Ingersoll-Rand. 14" x 7 1/2" x 12"
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- 1-898 CFM Union. 18" x 12"
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- 1-7 ton Atlas battery. 36" gauge
- 3-8 ton Ironton battery. 36" gauge
- 2-8 ton General Electric battery. 36" gauge
- 4-10 ton Atlas battery. 36" gauge
- 1-3 ton Whitcomb gas engine driven. 24" gauge
- 1-4 1/2 ton Goodman trolley. 36" gauge
- 1-5 ton Jeffrey trolley. 36" gauge
- 1-6 ton Goodman trolley. 36" gauge
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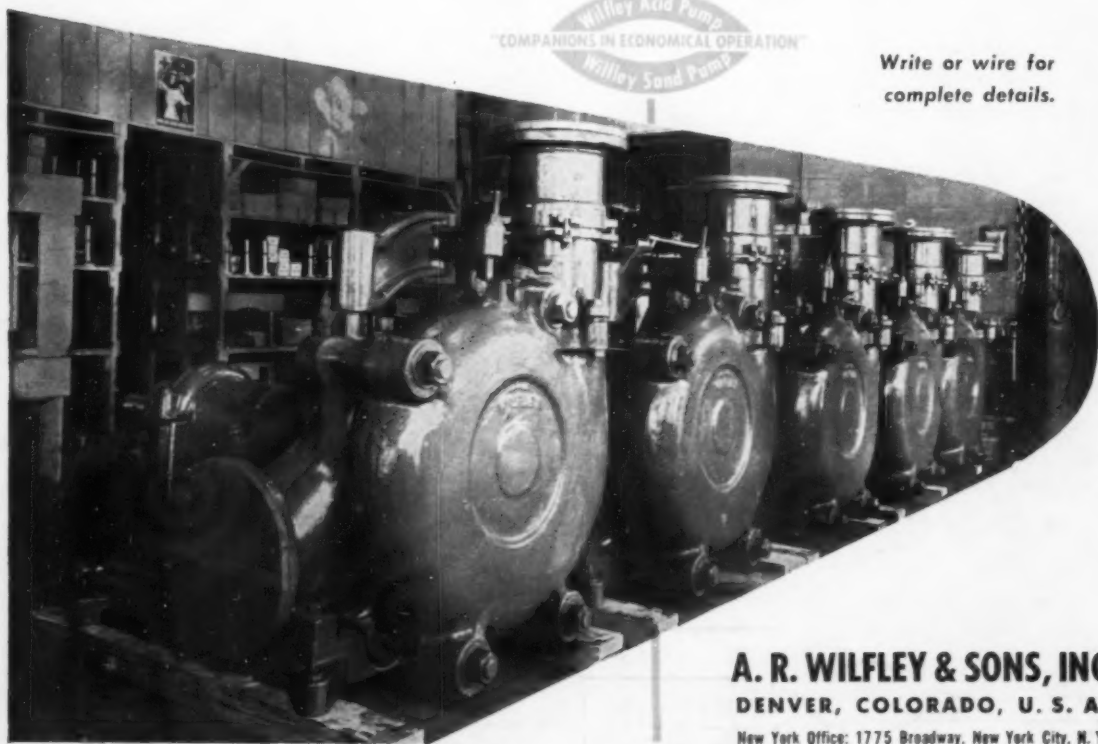
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